JOURNAL OF THE ROYAL HORTICULTURAL SOCIETY

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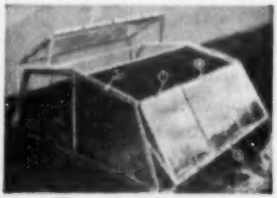

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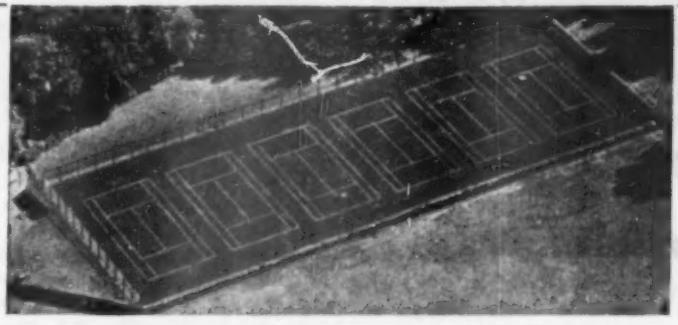

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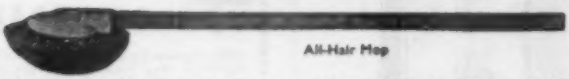

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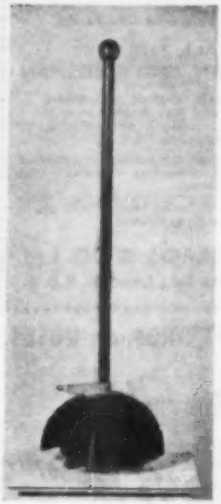

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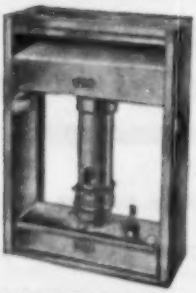

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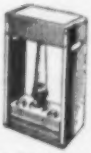

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Extracts from
THE PROCEEDINGS OF
THE ROYAL HORTICULTURAL SOCIETY

GENERAL MEETINGS

JUNE 27, 1950

JOINT DELPHINIUM COMMITTEE—Mr. T. Hay, C.V.O., V.M.H., in the Chair, and seven other members present.

Selected for trial at Wisley
'Royalist,' shown by Messrs. Blackmore & Langdon, Bath.

Other Exhibits
'Frederick Grisewood' (selected for trial 1946) and 'Startling' (selected for trial 1949), shown by Messrs. Blackmore and Langdon, Bath.
Belladonna 'Fairy Wings,' shown by W. A. Hawkes, Esq., The Moat House, Holwell, Hitchin, Herts.

JOINT DIANTHUS COMMITTEE—Mr. G. Munro, C.B.E., V.M.H., in the Chair, and eight other members present.

Exhibits
'Margaret Curtis' and 'Daydawn' (selected for trial 1948), shown by Messrs. W. E. Th. Ingwersen, Ltd., East Grinstead, Sussex.

JOINT IRIS COMMITTEE—Mr. G. L. Pilkington in the Chair, and seven other members present.

Selected for trial at Wisley
Iris ochroleuca (Ephesus), shown by C. W. Christie-Miller, Esq., Swyncombe House, Henley-on-Thames.

JOINT ROCK GARDEN PLANT COMMITTEE—Col. F. C. Stern, O.B.E., M.C., F.L.S., V.M.H., in the Chair, and ten other members present.

Awards Recommended

Award of Merit

To *Campanula garganica* var. *fenestrellata*, as a hardy flowering plant for the rock garden or alpine house, from Mrs. A. N. Griffith, Paradise House, Newnham, Cambridge.
To *Sempervivum arachnoideum* var. *Laggeri*, as a hardy flowering plant for the rock garden or alpine house, from W. Howell, Esq., Town Hall, Beckenham, Kent.

Other Exhibits
Androsace alpina, from G. H. Berry, Esq., The Highlands, Ridgeway, Enfield, Middx.
Sempervivum octopodes apetalum, which was referred to the Scientific Committee, from Mrs. A. N. Griffith, Paradise House, Newnham, Cambridge.
Campanula hercegovina var. *nana* (**A.M.** 1946), from E. W. Sandford, Esq., 99 Leander Road, Thornton Heath, Surrey.

JUNE 28, 1950

JOINT DELPHINIUM COMMITTEE—Mr. T. Hay, C.V.O., V.M.H., in the Chair, and nine other members present.

Selected for trial at Wisley
'Elizabeth Schumann,' shown by C. R. Wootton, Esq., 119 Lichfield Road, Bloxwich, Walsall.

JULY 11, 1950

SCIENTIFIC COMMITTEE—Mr. E. A. Bowles, M.A., F.L.S., F.R.E.S., V.M.H., in the Chair, and three other members present.

Fasciated Gaillardia.—Mrs. V. A. Simonsen of Wood Green sent a fasciated Gaillardia bearing two flowers joined together at the end of its stem. The Committee examined this with interest.

FRUIT AND VEGETABLE COMMITTEE—Mr. F. A. Secrett, C.B.E., F.L.S., V.M.H., in the Chair, and twenty-four other members present.

Exhibits
Collection of Soft Fruit varieties from the National Fruit Trials, Wisley, Ripley, Surrey.
Lettuce 'Great Lakes' and Seakale Beet 'Fordhook Giant' from Mrs. H. W. Hall, Downton Fields, Hordle, Lymington, Hants.

FLORAL COMMITTEE A—Mr. G. W. Leak, V.M.H., in the Chair, and sixteen other members present.

Awards Recommended:

Silver-gilt Flora Medal

To Messrs. Blackmore & Langdon, Bath, for an exhibit of herbaceous plants.
To Messrs. E. Webb & Sons (Stourbridge) Ltd., Stourbridge, for an exhibit of Sweet Peas and Larkspurs.

Silver-gilt Banksian Medal

To Messrs. Thomas Carlile, Ltd., Twyford, for an exhibit of herbaceous plants.
To Messrs. S. McGredy & Son, Portadown, for an exhibit of Roses.

Silver Banksian Medal

To Messrs. Frank Cant & Co., Colchester, for an exhibit of Roses.
To Messrs. Daniels Bros., Ltd., Norwich, for an exhibit of Roses, Sweet Peas and Larkspurs.
To Messrs. R. & E. Ratcliffe, Chilton, for an exhibit of Roses.
To Messrs. E. W. Stedman, Ltd., Longthorpe, for an exhibit of Roses.
To Suffolk Seed Stores Ltd., Woodbridge, for an exhibit of herbaceous plants.
To Messrs. Wheatcroft Bros., Ltd., Ruddington, for an exhibit of Roses.

Flora Medal

To Messrs. A. Dickson & Sons, Ltd., Newtownards, for an exhibit of Roses.
To Mr. E. B. Le Grice, North Walsham, for an exhibit of Roses.
To Messrs. M. Prichard & Sons, Ltd., Christchurch, for an exhibit of herbaceous plants.
To Messrs. Wakeley Bros. & Co., Ltd., London, for an exhibit of herbaceous plants.
To Messrs. A. Warner & Son, Boxted, for an exhibit of Roses.

Banksian Medal

To Messrs. B. R. Cant & Sons, Ltd., Colchester, for an exhibit of Roses.
To Messrs. Hale & May, Ltd., Cookham, for an exhibit of herbaceous plants and Roses.
To Mr. A. Miles, Bickley, for an exhibit of herbaceous plants.
To F. T. S. Stagg, Esq., Woodford Green, for an exhibit of Coleus.

Award of Merit

To Begonia 'Shirley Desire,' as a greenhouse flowering plant (votes 8 for, 2 against), from Messrs. H. Woolman, Ltd., Shirley, Birmingham.
To Rose 'Eden Rose' (votes 16 for, 0 against), from Messrs. Wheatcroft Bros., Ltd., Ruddington.
To Rose 'Moonbeam' (votes 12 for, 0 against), from Mr. H. Robinson, Hinckley, Leicester.
To Rose 'Yves Latieulle' (shown as 'Mme. Yves Latieulle') (votes 16 for, 0 against), from Messrs. Wheatcroft Bros., Ltd., Ruddington.

Selected for trial at Wisley

Chrysanthemum maximum 'Jennifer Read,' from Mr. F. G. Read, Deopham, Norfolk.
Petunia 'Fire Chief,' from Mrs. H. W. Hall, Lymington, Hants.
Hemerocallis seedlings RC/A and CR/A, from N. L. Cave, Esq., Thames Ditton.

Other exhibits

Carnations 'Thornton Scarlet' and 'Thornton Yellow' (to be seen again), from Mr. E. A. Tickle, Thornton Heath.
Chrysanthemum Parthenium fl. pl., from F. Buckland, Esq., Bexley Heath.
Hardy plants, from Mr. C. Newberry, Knebworth.
Roses and Violas, from Mr. C. A. Jardine, Feltham.
Salvia seedling, from Mr. W. Clapham, Otford.

FLORAL COMMITTEE B—Lord Aberconway, C.B.E., LL.D., V.M.H., in the Chair, and twenty-one other members present.

Awards Recomended:

Gold Medal

To Messrs. W. A. Constable, Ltd., Southborough, for an exhibit of Lilies, Alstroemerias and other hardy flowering plants.
To Messrs. R. Wallace & Co., Tunbridge Wells, for an exhibit of Lilies, Eremurus, Alstroemerias and other hardy flowering plants.

Flora Medal

To Mr. K. W. Harle, Lower Basildon, for an exhibit of succulents.
To Messrs. Robinson, Eltham, for an exhibit of rock garden plants.

Banksian Medal

To Messrs. Burkwood & Skipwith, Ltd., Kingston, for an exhibit of flowering shrubs.
To East Lodge Gardens, Enfield, for an exhibit of rock garden plants.
To Hollybush Nurseries, Harpenden, for an exhibit of rock garden plants.
To Kew Topiary Nurseries, Ltd., Richmond, for an exhibit of clipped trees.

Award of Merit

To *Lavandula Spica nana atropurpurea*, as a hardy, flowering shrub (votes unanimous), from Messrs. Thos. Carlile (Loddon Nurseries) Ltd., Twyford, Berks.
To *Lilium* 'Ann Constable,' as a hardy, flowering herbaceous plant (votes unanimous), from Messrs. W. A. Constable, Ltd., Southborough.

Selected for trial at Wisley

Lilium 'Green Flush' exhibited by Messrs. W. A. Constable, Ltd.

Other Exhibits

Digitalis orientalis, *Lychnis chalcedonica plena*, exhibited by Messrs. M. Prichard & Sons, Ltd., Christchurch.
Hydrangea acuminata var. 'Bluebird,' *H. macrophylla* var. 'Ami Pasquier,' *H. macrophylla* var. 'Bluewave,' *H. serrata* var. *macrosepala*, exhibited by Mr. M. Haworth-Booth, Haslemere.
Lavandula 'Loddon Pink,' exhibited by Messrs. Thomas Carlile (Loddon Nurseries) Ltd., Twyford.
Lilium Bolanderi, *L. parvum* × *Parryi*, exhibited by W. Bentley, Esq., Newbury.
Lilium 'Lady Eve Price,' exhibited by Messrs. W. A. Constable, Ltd., Southborough.
Lilium 'Parkmannii' var. 'Delmonden Ruby,' exhibited by Dr. Maurice Amsler, Hawkhurst.
Styrax philadelphoides, exhibited by Capt. Collingwood Ingram, Benenden.
Collection of Lilies, exhibited by the Oregon Bulb Farms, Gresham, Oregon.
Collection of Spiraeas and Astilbes, exhibited by Mr. F. Street, West End, Woking.

ORCHID COMMITTEE—Mr. GURNEY WILSON, F.L.S., V.M.H., in the Chair, and six other members present.

Award Recommended

Cultural Commendation

To Mr. James W. Rose, Orchid grower to J. V. Rank, Esq., Ouborough, Godstone, for a large plant of *Coelogyne Dayana* bearing thirteen pendulous spikes and a total of over 500 flowers.

JOINT BORDER CARNATION COMMITTEE—Mr. T. HAY, C.V.O., V.M.H., in the Chair, and thirteen other members present.

Award of Merit

'Lothersdale' (for Exhibition), shown by W. Whiston, Esq., Lothersdale, Far Heath, Winterley, Sandbach.

Selected for trial at Wisley

'Lothersdale,' shown by W. Whiston, Esq., Lothersdale, Far Heath, Winterley, Sandbach.
'Scarlet Emperor,' shown by Mr. Geo. E. Toms, Appley Nurseries, Ryde, I.O.W.
'Greyling,' shown by Mr. F. W. Goodfellow, Valley Nurseries, Aldridge, Staffs.
'Downs Clove' and 'Downs Pink,' shown by Messrs. Allwood Bros. Ltd., Wivelsfield Nurseries, Haywards Heath, Sussex.

Other Exhibits

'Katherine Mapes' and 'Milkmaid,' shown by Mr. F. W. Goodfellow, Valley Nurseries, Aldridge, Staffs.
'Seedling No. 29' and 'Elegance,' shown by Mr. Geo. E. Toms, Appley Nurseries, Ryde, I.O.W.

JOINT ROCK GARDEN PLANT COMMITTEE—IRIS, Lady LAWRENCE, V.M.H., in the Chair, and six other members present.

Awards Recommended:

Preliminary Commendation

To *Primula xanthopa*, from Mrs. G. Knox Finlay, Keillour Castle, Methven, Perthshire.

Other Exhibits

Primula tenella (P.C. 1950), which the committee wished to see again next year, from Mrs. G. Knox Finlay, Keillour Castle, Methven, Perthshire.

JULY 18, 1950

JOINT BORDER CARNATION AND PICOTEE COMMITTEE—Mr. T. Hay, V.M.H., in the Chair and twelve other members present.

Awards Recommended:

First Class Certificate

'Royal Mail,' as a show variety (votes 11 for, 0 against), shown by Mr. F. W. Goodfellow, Valley Nurseries, Aldridge, Staffs. (**A.M.** 1949).

Award of Merit

'Sunstar,' as a show variety (votes 11 for, 0 against), shown by Mr. F. W. Goodfellow, Valley Nurseries, Aldridge, Staffs.

Selected for trial at Wisley

'Sunstar,' 'Gavotte,' 'Dusky Maid' and 'Waternymph,' all shown by Mr. F. W. Goodfellow, Valley Nurseries, Aldridge, Staffs.

AUGUST 1, 1950

SCIENTIFIC COMMITTEE—Mr. E. A. Bowles, M.A., F.L.S., F.R.E.S., V.M.H., in the Chair, and four other members present.

Saussurea stella.—The Committee recommended the award of a Botanical Certificate to *Saussurea stella*, exhibited by the Curator of the Chelsea Physic Garden. This remarkable member of the Compositae is a native of the high mountains of western China, eastern Tibet and the eastern Himalaya. It forms a stemless rosette of narrow outspread leaves, the broadened bases of the inner leaves being reddish and thus serving to attract attention to the closely clustered dull purple flower-heads. The whole plant thus functions as one flower with regard to pollination. It has a distinct honey-like fragrance. The plant shown had been lifted from the open ground at Chelsea. After flowering the rosette perishes but secondary rosettes may arise below it. *S. stella* is figured in *Bot. Mag.* 166 t. 85 (1949).

Tapeinochilus ananassae.—An inflorescence of this rare and little-known member of the Zingiberaceae was exhibited by Mr. David Sander, St. Albans. It had come from a garden at Torquay.

Hypericum.—A specimen of a shrubby Hypericum, provisionally named *H. patulum* 'Hidcote,' was referred to the Royal Botanic Gardens, Kew, for further study. According to the exhibitors, Messrs. T. Hilling & Co., Chobham, Surrey, it forms a bush up to 6 feet high and wide and is one of the hardiest of shrubby Hypericums. It was stated to have been introduced from western China by Major Lawrence Johnston, but might possibly have arisen in Britain.

Conifers.—The Committee expressed thanks for an exhibit of Conifers sent by Commander F. Gilliland of Brook Hall, Londonderry. These included *Sciadopitys verticillata*, *Abies Veitchii* and *Dacrydium Franklinii*.

Gladiolus Species.—A letter from Mr. R. L. Roberts of Enfield was read to call attention to certain errors in the naming of Gladiolus species by nurserymen and seedsmen. It was pointed out that some species have received a number of names and that some names have been applied incorrectly. Such a multiplication of synonyms and misidentifications occurs in many genera and is to be expected in such a variable and botanically difficult group as the South African species of Gladiolus.

Fasciated Forsythia.—A specimen of *Forsythia* × *intermedia spectabilis* showing the fasciation which often occurs in this and other Forsythias was shown by Mr. B. J. Bounard of Raynes Park.

Maize Inflorescence.—An inflorescence of *Zea Mays* with female flowers on the lower part of the axis but male flowers above was shown by Mr. J. A. T. Douglas of Dorking.

Sprouting Potato.—Mr. Collingwood Ingram exhibited a potato which had been left in a cellar since the winter and had put out two sprawling purplish hairy shoots, one 22 inches long, the other 10 inches long, with numerous whitish lateral ramifications, on some of which small tubers had developed.

Fritillaria Capsules.—A collection of capsules of *Fritillaria* species grown by Miss C. Beck of Great Amwell showed the great variation in form within the genus; all had small membranous teeth fringing the valves, a feature occurring also in the subgenus *Cardiocrinum* but not observed in other sections of Lilium. The capsules of *F. pallidiflora* and *F. lanceolata* have two prominent flanges on the back of each valve, unlike those of the other species exhibited (*FF. karadaghensis*, *Olivieri*, *acmopetala*, *pudica*, *pyrenaica*, *gracilis*).

Fasciated Lilium candidum.—Mr. E. A. Bowles showed a photograph of a fasciated specimen of *Lilium candidum* with the stem 3½ inches wide.

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THE SECRETARY'S PAGE

ANNOUNCEMENTS—NOVEMBER AND DECEMBER

Shows

TUESDAY, NOVEMBER 7 12 NOON to 6 P.M. WEDNESDAY, November 8 10 A.M. to 5 P.M.	Fortnightly Show. Floral Arrangement Competition for Amateurs. *British National Carnation Society's Competition.*
TUESDAY, December 5 12 NOON to 6 P.M. WEDNESDAY, December 6 10 A.M. to 5 P.M.	Fortnightly Show. Late Apple and Pear Competition.

Lectures

TUESDAY, November 7 at 3 P.M. "Hardy Heaths" by MR. F. HANGER.

TUESDAY, December 5 at 3 P.M. "Horticultural and Botanical Illustration" by MR. W. BLUNT.

Demonstrations at Wisley—The following demonstrations will be given at Wisley, that on the second day being in each case a repetition of the demonstration given on the first:—

Flower and Fruit Garden

November 1, 2. Planting of Fruit Trees and Roses. (2 to 4 P.M.)

Fruit Garden

November 29, 30. Pruning of Fruit Trees. (11 A.M. to 1 P.M.)

Colour Film.—A film has been prepared by Messrs. Plant Protection Ltd. on the subject of "The Vineyards and the Vines of France." The film describes the normal methods of growing vines including

grafting, pruning, pest and disease control, harvesting etc. and the making of some of the commoner types of wines. This film will be shown in the Lecture Room of the Society's New Hall at 3 P.M. on Wednesday, December 6. Fellows of the Society are invited to attend.

The Society's Examinations—Candidates who wish to enter for the Society's Examinations in Horticulture in 1951 are reminded that the closing dates for entry forms are as follows:—

General Examination in Horticulture, and General Examination in Horticulture for Juniors—Monday, January 15, 1951.

Examination for the National Diploma in Horticulture (Preliminary and Final) and N.D.H. (Honours)—Thursday, February 1, 1951.

Examination for Teachers of School Gardening (Preliminary and Final) Friday, April 27, 1951.

N.D.H. Qualifying Test—Monday, November 20, 1950.

Invited Trials, 1951—Details of these, together with information on the preparation for Invited Trials to be judged in 1952, will be found on page 454.

WISLEY IN NOVEMBER

AFTER this very wet summer it is probable that the full glory of the autumn colours will not appear until later than usual and therefore November will still see bold masses of crimson, gold and scarlet lighting up all parts of the Gardens. But even those who are unfortunate enough to visit Wisley on a wet or foggy day need not fear that they will be disappointed, for there will be much of interest in the greenhouses.

The collection of Orchids kindly presented last year by the Orchid Growers' Association is fully established in the Stove House and many of them are flowering now. There are a number of *Cypripedium* varieties and several species; for instance that rather rare and interesting plant *C. Fairrieanum*, considered by some to be among the most beautiful of the race. The petals, striped yellow, white and purple, shaped like a buffalo's horn, and fringed with black hairs, give it the appearance of some sinister insect. *C. bellatulum* should also be flowering. A plant of unknown origin, it resembles most closely *C. Godefroyae*. Another plant with an animal-like appearance is *Cirrhopetalum* 'Fascinator,' resembling a number of exotic crimson-striped lizards. One of the easiest to cultivate is *Zygopetalum Mackayi*, introduced from Brazil in 1826. It is valued for its attractive green and maroon markings and sweet scent. The first of the Coelogynes to open should be *C. fuliginosa*; our plant has peach-shaded flowers with a deep chocolate blotch, although there have been many collected forms from various parts of India with flowers varying to white or pink. In addition to these Orchids the house is well stocked with a variety of ornamental foliage plants and a decorative picture is formed round the tank by groups of Poinsettias and *Plumbago rosea* backed by the brilliant orange *Gesnera chromatella*.

The Temperate House is no less bright, the side staging packed with Pelargoniums, Begonias, Gloxinias, Balsams and especially species of Erica and Epacris. These latter are always very welcome at this time of year and it is surprising that the Epacris are not more generally grown.

E. impressa carries arching sprays, up to two feet long, of pink or white bells, while those of *E. ardentissima* are bright salmon-pink. *Erica canaliculata* makes an attractive white-flowered pot plant, but if grown out of doors, as it can be in the west of England, it becomes a striking shrub reaching a height of fifteen feet, the bells then being pale violet. A fine specimen of *Tibouchina semidecandra*, massed with royal purple, velvet-textured flowers, forms a focal point at one end of the house, while at the other *Cestrum pupureum Smithii* is carrying numerous cerise bells in contrast to the orange shades of *C. aurantiacum*. This month sees the first of a long succession of Camellias with *C. japonica magnoliaeflora*.

Flowers are scarce in the Half Hardy House this month, but there are several extremely ornamental foliage plants. *Pyrethrum ptarmiciifolium*, with finely dissected silver leaves, is most conspicuous; *Coronilla glauca* var. *pygmaea* forms a dense, grey-green bush; while beneath the satin-textured foliage of *Leucadendron arboreum* there are bright masses of *Convolvulus Cneorum* and *Helichrysum petiolatum*.

If Fellows are fortunate enough to make a visit to the Gardens on a fine sunny day, nothing could be more pleasant than a visit to Seven Acres approached by way of the old Apple Walk, flanked by broad masses of crimson and gold Azaleas and Viburnums and overtopped by the butter-yellow leaves of a fine old Tulip Tree. It may perhaps be by reason of the comparatively mild, frost-free spring we experienced that the ornamental fruiting trees and shrubs are bearing exceptionally heavy crops. There are some outstanding species of Berberis such as *B. Jamesiana*, *B. virescens*, the large fruited *B. Chitria* and the evergreen prickly leaved *B. verruculosa*. The Crabs, Cotoneasters (such as the late-ripening *C. lactea*, *C. serotina* and forms of *C. salicifolia*), Pyracanthas, Sorbus and Crataegus blend together to form a mellow autumnal picture.

Autumn tints are afforded by a good specimen of *Quercus coccinea* var. *splendens* clothed in deep crimson leaves, and the varied glowing shades of *Parrotia persica*, Dogwoods and Witch-Hazel. Most of the flowers have faded from the Heather Garden now but the banks of rusty brown, unlike most dead flowers, are far from unsightly.

There are a number of interesting plants in the Award of Garden Merit Collection, for in the case of a great number of the plants, they have been chosen with a view to providing interest during more than one part of the year. *Euonymus alatus* forms a small shrub clothed in unbelievably brilliant scarlet leaves which fall to reveal corky wings along the stems. This feature makes it an interesting plant for indoor decoration during the winter. The bare arching branches of the Snowberry, *Symphoricarpus albus laevigatus*, are weighed down by the waxen white berries. Near by the Cornelian Cherry should be producing small bright red fruits. If the weather is clement, bright yellow flowers of *Sternbergia lutea* will still be appearing among the rocks at the north end of the Collection.

Last month saw the end of the display on the Rock Garden but in the Alpine House the pendent creamy tubular flowers of *Cyrthanthus Mackenii* var. *Cooperi* are freely produced. The leaves of *Sedum cauticolum*, now purple and going thin and papery, form a decorative

touch, as do the strange seed-heads, like rabbits' tails, of *Trichinium Manglesii*. The prostrate *Iberis saxatilis* is to be seen here and, if the weather is good, the white flowers of *Saxifraga Fortunei*.

At the foot of the Laboratory Walls the first few flowers of *Iris unguicularis* may be discovered amid the untidy foliage. Trained against the wall *Cotoneaster horizontalis* is shedding the last crimson leaves, thereby fully exposing a heavy crop of scarlet berries.

FREDERICK JAMES CHITTENDEN, O.B.E., F.L.S., V.M.H.

THE death of FREDERICK CHITTENDEN deprives the horticultural world of one of the most eminent of its botanists, teachers and practical gardeners. The R.H.S. in particular has lost the most efficient and accomplished member of its staff since the days of LINDLEY and WILKS.

As one who worked happily with him for very nearly 50 years, I recall with pleasure and gratitude the blessing of his friendship and the benefit of contact with such a lovable and Christian character and the stimulation resulting from the unfailing flow of information so generously imparted to me from his encyclopædic knowledge.

CHITTENDEN was born at West Ham on October 25, 1873, and most of his childhood was spent at Leyton in Essex. He displayed an interest in plants while still a boy and living near the border of Epping Forest used to botanize there. At the age of 19 he became a teacher in his old school at Leyton and in 1900 he left to become lecturer in biology at the Essex County Council's East Anglian School of Horticulture at Chelmsford where he dealt with horticulture and bacteriology. In 1901 he married MISS ESTHER ADA FARNES. In 1902 he became a member of the R.H.S. Scientific Committee and two years later was appointed its Secretary, a post which he held till his death.

In 1907, a laboratory having been built at Wisley, CHITTENDEN was appointed as its director and as head of the School of Horticulture. At first he was single handed but was gradually joined by others. In 1908 he became, in addition, Editor of the Society's JOURNAL and was responsible for this for 31 years.

In 1919 SIR FREDERICK KEEBLE relinquished the Directorship of Wisley and was succeeded by CHITTENDEN, who then took over the control of the garden in addition to the scientific work and the training of the students. In the same year two farms were purchased, bringing the total area at Wisley up to about 220 acres, which added considerably to the responsibilities and work of the Director.

CHITTENDEN was one of the first in this country to draw attention to the problem of self-sterility in apples and pears, on which he began investigations at Chelmsford in 1902 and continued and extended them at Wisley.

On the establishment of the Laboratory at Wisley Fellows quickly availed themselves of the opportunity to obtain advice on diseases and

pests and cultural problems. This led to investigations on such things as Apple leaf-spot, rust of Cinerarias, Azalea gall, Peach leaf-curl, Celery leaf-spot, Lettuce leaf-rot and streak in Sweet Peas. Other matters investigated included the alleged benefit resulting from the artificial inoculation of leguminous crops with nodule bacteria and the influence of planting distance and "place" on the yield of crops.

Apart from his work in connection with the education of the students at Wisley, CHITTENDEN was a most active and valued member of the Examinations Board. He, more than any other one person, was responsible for the institution of the National Diploma in Horticulture which was established by the Council with the approval of the Board (now Ministry) of Agriculture in 1912, and for 27 years he acted as supervising examiner. His outstanding work for horticultural education was recognized in the 1950 New Year's Honours List by the award of the O.B.E.

When he left Wisley in 1931 he became Technical Adviser, Editor of the Society's publications and Keeper of the Lindley Library. From 1939 to 1950 he was Editor of the Royal Horticultural Society's *Dictionary of Gardening*. It is sad that he has not lived to see the publication of this great work which he had so nearly completed and to receive the kudos rising from the years of work which he had spent on it.

His earlier publications include *The Garden Doctor—Plants in Health and Disease* (1920); Papers on Fungi and Mosses in scientific Journals; reports of investigations on plant disease, pollination in orchards and other technical matters in the JOURNAL and elsewhere; the first edition of *Some Good Garden Plants* (1929); and the *Index to the Botanical Magazine* (1950).

He represented the Society in 1926 at the International Conference on Flowers and Fruit Sterility at New York and the International Congress of Plant Sciences at Ithaca, N.Y., when he took the opportunity to travel across to California, up the Pacific States to British Columbia and across Canada. He also served as one of the Society's delegates to the International Botanical Congresses at Cambridge (1930) and Amsterdam (1935); the International Congress at Berlin (1927); and the Horticultural Conferences in Vienna (1927), Paris (1932), Rome (1935) and Berlin (1938), at the last of which he was appointed Chairman of the section on the nomenclature of garden plants, a subject on which he was a recognized authority. He also visited Holland on the Society's behalf on several occasions.

One of the greatest of our present-day gardeners in a letter to me writes: "It has always seemed to me that his natural modesty caused his great ability and value to be under-estimated by quite a number of folk whom one would have expected to know better." As an example of this few realize that the invaluable discovery of the warm-water treatment for the destruction of the Narcissus Eelworm now so universally practised, arose from experiments he made while he was working at Chelmsford. MR. J. K. RAMSBOTTOM was engaged to carry out the further investigations at Wisley under the supervision of the Director which led to such a satisfactory solution of the problem.

Many living monuments of his skill and foresight in landscape gardening can be seen at Wisley, notably in the Seven Acres of which

previously little use had been made. CHITTENDEN planned this to accommodate the many shrubs and trees raised from seed sent by FARRER from Kansu and by FORREST from Western China. An old gravel pit was converted into the beautiful lake with its picturesque groupings of Weeping Willows and surrounding shrubs. The fine heath garden owes its existence to his observation of the natural and luxuriant growth of ling in small colonies on its present site. MR. FREDERICK HANBURY and I were requested by the Council to assist the Director in the creation of a heath garden but the plan and the collection of suitable plants were mainly the work of CHITTENDEN. It has remained substantially unchanged to the present day. He also initiated the trials of hardy fruits, now the National Fruit Trials, and gathered together a notable collection of rose species.

Among his natural qualities he was remarkable for his great capacity for work; meticulous accuracy in all that he wrote; remarkable eyesight which enabled him to write a small but exceptionally legible hand without glasses up to his death. He was temperate to the point of austerity and had remarkable powers of self control, possessing iron nerves and he apparently knew no fear. He bore no ill-will even when he might have considered that he had just cause; having decided what he considered to be the right course, he pursued it unperturbed by criticism and, even when that was groundless, disdained self-defence. He was a kindly man, who loved and was beloved by children; he was always willing to help those who sought his advice, and they were many. Although possessed of an encyclopædic knowledge of horticulture he felt it no disgrace to say "I don't know," an admission which he made much more frequently than the average man. He was especially fortunate in being gifted by nature with a soft and pleasant voice and particularly clear enunciation and the power of expressing himself in simple good English, often a ripple of humour mingled with the steady flow of deep knowledge. I remember an occasion when members of the Scientific Committee undertook to investigate the edible qualities of the tubers of *Tropaeolum tuberosum*. When the result was reported, most of us described it as insipid, but CHITTENDEN added "I thought the white sauce tasted very nice."

He was a great gentleman.

E. A. BOWLES.

MASTERS MEMORIAL LECTURES, 1950

THE ORIGIN AND IMPROVEMENT OF CULTIVATED PLANTS

M. B. Crane, F.R.S., A.L.S., V.M.H.

PART I

(DR. H. V. TAYLOR, C.B.E., V.M.H., *in the chair*)

IN these lectures it is my purpose, firstly, to give an account of the different ways our cultivated plants have come about, and secondly, to describe what is being done to improve them further. These two subjects are, of course, intimately associated, as the more we know of the methods by which our decorative and economic plants have originated, the better we are able to appreciate the possibilities of further improvement.

Our cultivated races of plants, like all living organisms, owe their individuality and characters to the materials they have received from their parents. The transmission of these materials from one generation to another depends normally upon the production of specialized cells—the germ-cells, and it is by the union of these cells, one from each parent, that the genes, which determine the character of the plant, are transmitted to the offspring. It therefore follows that the constitution of a plant and the way in which it has originated will be reflected in the variation of its offspring and in the mode of inheritance of its characters.

Many of our cultivated plants have been under culture from very early times and the manner of their origin is often little known. For centuries, selection was the only method that was used to improve them, and natural seedlings of selected plants were the only material from which selection was possible. Hence in these early times selection operated on the maternal side only; pollen came by chance from other individuals and there was no control of the male parent.

The discovery of sex in plants, in the eighteenth century, meant the realization that the male parent is as important as the female parent. This gave much impetus to the breeding of plants, but it was not until after the rediscovery of MENDEL'S papers towards the close of the nineteenth century that the full possibilities of plant breeding became apparent. During the present century the concept of the gene as the unit or "atom" of inheritance, and the identification of the chromosomes as strings of genes, has put the whole matter in a new light. In recent times, modern methods of research, a combination of genetics, cytology, physics and chemistry, have already shown how many of our present-day cultivated plants have originated, what their ancestors were, and at the same time they have also provided us with knowledge of how new and improved plants may be obtained for cultivation in the future.

These have shown that from an evolutionary point of view we can arrange our races of cultivated plants conveniently in four classes according to their mode of origin, although the classes overlap. These classes originate as follows:

(1) By selection from gene-mutations within a single species.
(2) By simple auto-polyploidy, such as results from the functioning of unreduced germ-cells or from somatic duplication of the chromosomes without hybridization.
(3) By selection from products of interspecific hybridization unaccompanied by chromosome duplication.
(4) By interspecific hybridization accompanied by chromosome doubling or other nuclear aberrations.

Of course, selection is much quicker with hybridization than without it, and with chromosome doubling new types are produced *per saltum*. These different methods by which new kinds of cultivated plants have originated are, we believe, the principal causes of variation in nature and the processes by which evolution continues. They occur both in nature and under cultivation, and give rise to new varieties, races and species of plants.

1. *Gene mutations*

The part which gene mutations have played in the origin of new and improved varieties of plants is evident from the many new and improved plants which have appeared even within living memory. The Sweet-Pea, for example, was widely cultivated fifty years ago, but at that time no great range of varieties existed, but since then not only has the range of flower colour been greatly extended, but large differences have appeared in habit of growth, structure of leaves, and flowers. Indeed, the more attractive SPENCER form of flower with erect, large, waved petals has completely ousted the old hooded form from cultivation, and as a result the Sweet-Peas we grow to-day are as distinct from those we grew at the beginning of the present century as were the latter from the Sweet-Peas first grown in England from the seed sent by the Sicilian monk FRANCISCUS CUPANI in 1699. Similar remarks apply to the Chinese Primula, the Tomato, the Raspberry, the edible Pea and a vast number of other plants.

Such new varieties of plants have resulted spontaneously by gene-mutations; that is to say from inherent genetic changes. They are not due to hybridization, nor, as is sometimes supposed, to the direct effects of cultivation. Indirectly, however, cultivation has played an important part: first on account of the close inbreeding practised by the cultivator which reveals latent mutations; secondly on account of selection and vegetative reproduction, which enables mutations to be maintained as distinct strains or varieties irrespective of whether they have arisen through the sexual process from seeds or asexually from bud-sports; thirdly, the protection which cultivation frequently affords enables the less robust types to survive. Another important result of cultivation is that geographical and ecological barriers are artificially overcome; species which are often distantly separated in nature are commonly

brought together in gardens and plantations and this has provided opportunities for hybridization and has led to important results.

Gene-mutations, of course, always attract the plant breeder and by cross-breeding he often rapidly re-combines noteworthy new mutations with other desirable characters.

Gene-mutations have also been responsible for some remarkable plants commonly found in cultivation. Most plants, from the standpoint of genetics and inheritance, are the same all through, and consequently, when they are propagated vegetatively, it does not matter which tissue—stem, root, tuber, etc.—is used to start the new individual, or whether the tissue originates from the inside or outside of the plant; the resulting offspring are always the same, and if they are established varieties they generally reproduce themselves from seed. There are, however, a surprisingly large number of plants which do not possess this uniformity or individuality and, when they are propagated, different tissues give rise to different types of offspring. Such plants are composed of two or more genetically distinct tissues and they can be classified according to the way in which these different tissues are arranged and grow. In a common type, one genetic type or variety surrounds another, just as a glove covers a hand. Most of these plants have arisen by gene-mutation occurring in the somatic, or body tissues, in such a way that only certain layers which go to make up the plant are affected by the change. Now, many plants can be propagated by root cuttings, and by adopting this and kindred methods their exceptional make-up has been demonstrated, as buds from roots which grow up to form shoots and new plants usually arise from the internal tissues. By propagating *Bouvardias* in this way BATESON (1916) found that root-cuttings of the pink-flowered variety 'Bridesmaid' produce the red-flowered variety 'Hogarth.'

Many varieties of Potatoes are of the same class and their chimerical structure was first demonstrated by ASSEYEVA in Russia (1927) by a different but equally simple method, viz. by removing the eyes of the tubers and thus stimulating the internal tissues below the excised eyes to form buds and shoots. The variety 'Golden Wonder,' which has a thick brown russet skin, contains internally the variety 'Langworthy,' which has a thin white smooth skin. Chimerical plants, such as these, often present a problem to the plant-breeder, for the external glove-like variety may have a thickness of one or more cell layers. Now the reproductive cells of plants are generally formed from the sub-epidermal or second layer; hence the germ-cells—the egg-cells and pollen—will be of the kind of which this layer is composed. Thus the thick brown russet skin character of the Potato 'Golden Wonder' is genetically only skin deep; as a result the germ-cells are all 'Langworthy,' and in sexual reproduction the russet character is not passed on and the offspring are all smooth. 'Langworthy' was known before 1876 and 'Golden Wonder' was first distributed in 1906, and it is clear that the latter arose as a somatic mutation, or in other words as a bud-sport from 'Langworthy.'

The occurrence of bud-sports in plants has for long attracted the attention of the horticulturist and plant-breeder alike. They affect all kinds of characters such as leaves, habit of growth, colour of fruit and

flowers and so on. But many of them are of the same fantastic make-up as the 'Golden Wonder' Potato, and where the bud-sport is the result of a change in the epidermal layer only, it can only be increased and maintained by asexual reproduction. To further demonstrate the significance of this to the plant-breeder I will refer to an experiment by CLAUSEN and GOODSPEED (1923). They crossed two varieties of *Nicotiana*, one with carmine and the other with white flowers. In this cross carmine is dominant to white and the F_2 generation approximates to the dihybrid expectation of 9 carmine : 3 pink : 4 white. In the F_1 generation 200 plants were raised and all had carmine flowers except one. This exceptional plant was divided into two parts, one having carmine and the other bright pink flowers. A genetic analysis was made of two parts by appropriate breeding investigations, and the following gives the results obtained:

Parents	Carmine	Pink	White	Total
Carmine selfed . .	48	13	39	100
Pink selfed . . .	56	13	31	100
Expectation 9 : 3 : 4 . .	56·25	18·75	25	100
Back-crosses:				
White × Carmine . .	54	29	64	147
White × Pink . .	40	37	72	149
Expectation 1 : 1 : 2 . .	37	37	74	148

Plants were raised from stem-cuttings from both parts of the plant, and the two clones raised were uniform for carmine and pink flowers respectively. Plants were also raised from root-cuttings of both the carmine and pink clones, and the plants obtained from all produced only carmine flowers. This behaviour in vegetative propagation and the above breeding results show that the change resulting in the pink-flowered bud-sport was only skin deep and did not involve the second layer from which the germ-cells—the ovules and pollen—are derived.

The albo-marginate variegated varieties which occur in *Pelargonium* and other plants have a green core and white outer layers. Others have a white core and green outer layers. In many the two outer layers are white, and in others, in the reverse condition they are green. Hence, when self-pollinated, those with white outer layers give only white seedlings, and root cuttings all green plants. In the same way in the reversed make-up—green over white—the seedlings are all green and root-cuttings white.

Chimaeras of this kind have also arisen spontaneously following the horticultural practice of grafting. They have occurred in this way in Apples, Roses, Medlar, Cytisus and other plants. They have also been deliberately produced by grafting (see Figs. 223, 224 and 225).

I have dwelt at some length on the subject of bud-sports, as they often intrigue the horticulturist and especially those who breed plants. Sports affecting the colour of flowers and other characters are common in Chrysanthemums, Dahlias, Roses and many other plants. They are

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RHODODENDRON

This book contains a full account by Mr. Eric Savill of the Rhododendron planting and the very interesting and beautiful gardens which he has made in Windsor Great Park; this is illustrated with an unusually good selection of photographs. Mr. C. E. Puddle writes on dwarf Rhododendrons suitable for the small garden, and Mr. A. T. Johnson writes on Rhododendrons as foliage plants, while Mr. N. G. Hadden describes some of the Rhododendrons he grows in his woodland garden in Somerset. The book also contains accounts of the Rhododendron Show and the awards to Rhododendrons given during 1950 and an article by the editor on the journeys of and the Rhododendrons collected by Sir Joseph Hooker in the Sikkim-Himalaya. The first account of the Chromosome numbers in the genus Rhododendron is also given from work done at Wisley. There are also included in the book a number of interesting notes dealing with Rhododendrons in various gardens.

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DAFFODIL AND TULIP

This number of the *Daffodil and Tulip Year Book* contains an interesting account by Mr. Bowles of the Narcissi featured in an old picture by Jan Breughel. Miniature Daffodils are described by Colonel F. C. Stern, V.M.H., and Tulip species by Mr. R. D. Trotter, articles which should have exceptional interest for all growers of these attractive bulbs. A new species of Narcissus, *N. atlanticus*, is described by Colonel F. C. Stern, and Mr. Guy L. Wilson deals with some of the flowers that he saw in 1950. Major C. B. Habershon describes the points of a good Daffodil and how to stage Daffodils for exhibition, and gives his selection of the best twenty-five Daffodils for exhibition. There is a special section on the resistance of Narcissus varieties to pests and diseases. The book also contains full accounts of the Daffodil Shows for 1950, both in this country and overseas, together with a list of new Daffodils registered in 1950, as well as descriptions of those which have received awards. In the Daffodil Ballot will be found again recommended selections of most suitable Daffodils for growing, both in bowls and in the open for exhibition and for house decoration.

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usually readily maintained by vegetative propagation, but as we have seen, their use in further breeding work depends upon whether or not the change involves the germ-tract.

2. *Auto-polyploidy*

The second mode of origin, a simple doubling of the chromosome number has given, and is continuing to give, us many new plants. Most varieties of Raspberries have fourteen chromosomes, but 'Belle de Fontenay,' 'Merveille Rouge' and several others have twenty-eight. They have arisen from the fourteen chromosome kinds during the past eighty years. In the Chinese Primula there are varieties with twenty-four chromosomes and others with forty-eight. The latter have larger flowers and sturdier growth and arose from the twenty-four chromosome forms spontaneously at the beginning of the present century.

In quite recent times two new large forms of Pears have arisen as bud-sports, one in this country and one in America. They have larger fruits and twice the usual number of chromosomes, namely sixty-eight instead of thirty-four. These are examples of new races of plants which have arisen from a complete duplication of the chromosome number. Sometimes as in *Primula*, they have come about through the sexual process, the germ-cells having a double number of chromosomes; and sometimes, as in the Pear, vegetatively, a double number of chromosomes occurring in the somatic or body cells.

Many varieties of plants have one and a half times as many chromosomes as their parents, not twice as many as in the new Primulas and Pears. Thus Apples are of two kinds. Some, the diploids, have thirty-four chromosomes (two sets of seventeen), and others, the triploids, have three sets with fifty-one chromosomes. The latter arose from the union of a normal reduced germ-cell with seventeen chromosomes and an unreduced germ-cell with a double set, thirty-four. Many other horticultural varieties of plants are triploids and of a similar origin. For example, such important varieties of garden Tulips as 'Keizerskroon,' 'Massenet' and 'Pink Beauty' are triploid; many widely grown varieties of the garden Hyacinth are also triploid of a similar origin. The first to appear was 'Grand Maître' in 1870. Other outstanding triploid varieties are 'General de Wet,' 'King of the Blues,' 'Queen of the Pinks,' 'Lord Balfour' and 'Lord Derby.' On account of their inability to breed true, triploids and other odd-numbered polyploids are in horticulture naturally confined to species that are reproduced asexually, as by bulbs, corms, grafting, etc. Nevertheless among the triploids we find many important varieties. Thus in Apples the properties of the triploid 'Bramley's Seedling,' its hardy constitution, high vitamin C content, and admirable cooking qualities are reflected in the position this variety holds in the Apple population of this country. 'Belle de Boskoop,' another triploid, is one of the most popular Apples on the continent of Europe. 'Ribston Pippin,' one of the richest flavoured Apples, 'Blenheim Orange,' one of the best all-round Apples in cultivation, and 'Gravenstein' and 'Reinette du Canada,' are other notable triploids.

A further example of flower improvement due to polyploidy occurs in Narcissi. In the Trumpet Narcissi such old varieties as 'Henry

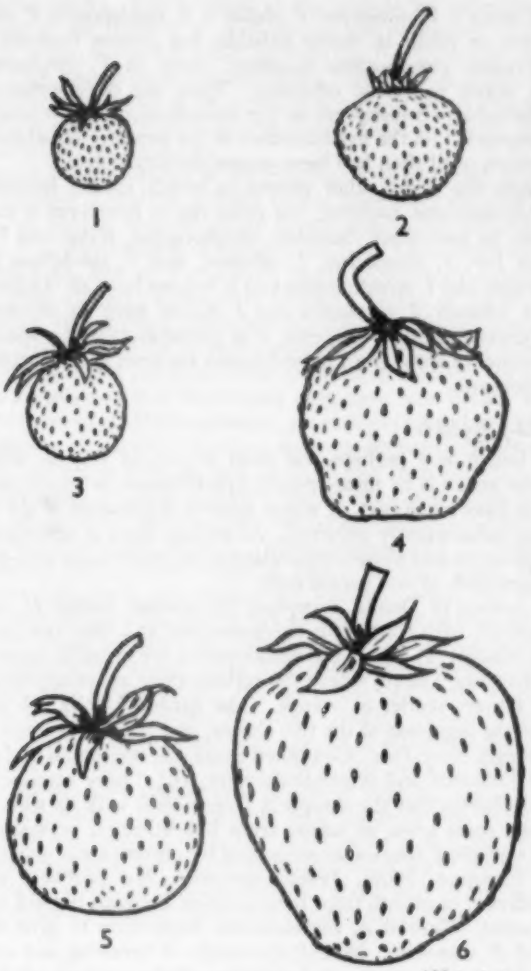
Irving' and 'Golden Spur' are diploid with fourteen chromosomes, the larger flowering 'Emperor' is triploid with twenty-one, and the even larger 'King Alfred' is tetraploid with twenty-eight, In recent times polyploid forms have been found in *Nerine*, and as a result it is probable that new and improved forms will soon appear in this genus.

3. *Interspecific hybridization*

The third process or mode of origin which has led to improvement in our garden plants has been by interspecific hybridization unaccompanied by chromosome duplication or other major cytological aberrations. This has occurred from hybridization both between diploid and between polyploid species. Three species of *Ribes* appear to have entered into the constitution of the garden Red Currant, namely *Ribes vulgare*, *R. rubrum* and *R. petraeum*. Some cultivated varieties are predominantly *vulgare*, others *rubrum* and others *petraeum*. Some again combine the characters of one or another pair of these species. All the species and varieties appear to be diploid. They have sixteen chromosomes, two sets of eight.

The development of the garden Strawberry is another example which shows how new and important plants have come about by selection from the offspring of species-crosses without the direct intervention of chromosome doubling. The cultivation of the Strawberry in Europe goes back to the fourteenth century. At that time only the wild wood Strawberry, *Fragaria vesca*, was grown under cultivation. *F. elatior*, found sporadically in the woods on the continent of Europe, and *F. virginiana*, the woodland and hedgerow Strawberry of eastern North America, were brought into cultivation in the sixteenth and seventeenth centuries respectively. The fruits of all three species are small, and at that time no appreciable increase in the size of fruits had occurred under cultivation. Early in the eighteenth century a fourth species, *F. chiloensis*, with large fruits, was introduced into Europe from South America. *F. chiloensis* is a dioecious species, *i.e.* its male and female flowers are on different plants. Unfortunately all the plants introduced were female, and for a long time, owing to the absence of pollen, no fruit was obtained from them. Later some of the plants were grown near other Strawberries such as *F. elatior* and *F. virginiana*. These pollinated the *chiloensis* plants and satisfactory crops developed. The fruits though large were poor in colour and quality, but seeds from them, the result of crossing with *F. virginiana*, were the beginning of our modern race of Strawberries. The first varieties of this type, combining the larger size of *F. chiloensis* with the aromatic qualities of *F. virginiana*, appeared in France towards the end of the eighteenth century. It was not, however, until the early part of the nineteenth century that any considerable progress was made. At this time the English horticulturists took the lead and the advance they made was due to the raising of plants from seed and deliberate cross-breeding.

The genus *Fragaria* has been critically studied and the chromosome number of the different species determined. The details given in Text Fig. 1 make the story clear. Experiments have shown that crosses between the species with different chromosome numbers (see Text Fig. 1),



Text Fig. 1—The origin and development of the garden strawberry.

		Chromosome number	Period
1	*Fragaria vesca*	14	1300–
2	*Fragaria elatior*	42	1500–
3	*Fragaria virginiana*	56	1600–
4	*Fragaria chiloensis*	56	1700–
5	Keen's Seedling	56	1821–
6	Royal Sovereign	56	1892–

such as *F. vesca* × *F. elatior* and *F. elatior* × *F. virginiana* or *F. chiloensis*, are abortive or result in sterile hybrids, but crosses between species with the same chromosome numbers, such as *F. virginiana* × *F. chiloensis*, result in fertile offspring. Thus the development of the garden Strawberry subsequent to the introduction of new species into Europe depended on the hybridization of the two fifty-six-chromosome species which until then had been geographically isolated.

Amongst the many other genera in which species hybridization, without chromosome doubling, has given rise to new races of cultivated plants may be mentioned *Dianthus*, *Streptocarpus*, *Rubus* and *Vitis*. In the genus *Iris*, *I. chamaeiris*, *I. olbiensis*, and *I. sub-biflora* have 40 chromosomes and *I. mesopotamica* and *I. trojana* have 48. Other species such as *I. albicans*, *I. germanica* and *I. Kochii* have 44 chromosomes, and as RANDOLPH (1935) suggests, it is probable that the species with 44 chromosomes arose from hybridization between species with 48 and 40 chromosomes.

4. *Hybrid-polyploids*

The fourth and perhaps the most important way in which new forms have arisen is by inter-specific hybridization in which unreduced germ-cells have taken part, or where somatic duplication of the chromosomes has subsequently occurred. As before, there is sometimes complete duplication and sometimes unilateral duplication, *i.e.* non-reduction of the germ-cells of one parent only.

The species of Dahlia, excepting the garden Dahlia *D. variabilis*, are tetraploid, with thirty-two chromosomes, and they can be divided into two classes: (*a*) where the anthocyanins are cyanidin types and the flowers magenta, and (*b*) where the anthocyanins are pelargonidin types and the flowers scarlet or orange. The garden Dahlia, *D. variabilis*, combines the pigments of the two classes, and it also has twice as many chromosomes, sixty-four. Combined genetical, cytological and chemical studies (LAWRENCE and SCOTT-MONCRIEFF, 1935) have convincingly led to the conclusion that the octoploid *D. variabilis* with its wide range of colour and form arose in nature from hybridization between the two types of tetraploid species accompanied by chromosome duplication.

Our European Plum, *Prunus domestica*, has probably arisen on many different occasions from hybridization between diploid and tetraploid species, followed by chromosome duplication to give the fertile hexaploid *P. domestica*. Indeed the results of breeding and cytological investigations with species and varieties of *Prunus* have all led to the conclusion that the diploid Cherry-Plum *P. cerasifera* with sixteen chromosomes, and the tetraploid Sloe *P. spinosa* with thirty-two, are the ancestral species of the hexaploid *P. domestica* with forty-eight chromosomes (CRANE and LAWRENCE, 1947). This view is supported by a consideration of the variation which occurs within these species; thus, in *P. cerasifera* the ground colour of the fruits is yellow and the anthocyanin red. In *P. spinosa* the ground colour is green and the anthocyanin blue, and the range of variation in both species is limited. In *P. domestica*, however, both red and blue colours and also yellow and green grounds occur, and from their various recombinations an infinitely wider range

of variation results. The increase in size and wider variation in form and flavour of the fruits of *P. domestica* is also in agreement with this view (Fig. 226). Normal hybrids between the two ancestral species are triploids with twenty-four chromosomes, three sets of eight: they are highly sterile and are still to be found in nature. The cultivated garden Plums which have forty-eight chromosomes, twice as many, are highly fertile (DARLINGTON, 1928–33).

Although precise details are not known, it is generally agreed that the pink-flowered Chestnut *Aesculus carnea* arose from the hybridization between two distinct sections of the genus, namely the common Horse Chestnut *A. Hippocastanum* of Europe and Asia, which makes a tree up to 100 feet high, and *A. Pavia* from North America, a comparatively small shrubby species, which only attains a height of about 12 feet. Several other well-marked characters separate *A. Hippocastanum* from *A. Pavia*. The fruits of the former are very spiny and the flowers usually have five petals with a patch of colour confined to the base. In *A. Pavia* the fruits are smooth and the flowers only have four petals, which in contrast to those of *A. Hippocastanum*, are richly coloured and glandular at the margins. *A. carnea* is in many respects intermediate between the above two species; it makes a tree 50 to 70 feet high and its fruits are only slightly spiny. In habit of growth and foliage it resembles *A. Hippocastanum*, whilst in the colour of its flowers and glandular edged petals it approaches *A. Pavia*. Both *A. Hippocastanum* and *A. Pavia* have twenty pairs of chromosomes whilst *A. carnea* has forty pairs. Breeding experiments have been also carried out with *A. carnea* and the taxonomic, genetic and cytological studies all confirm its hybrid origin.

Amongst other horticultural plants which have arisen from interspecific hybridization accompanied by chromosome duplication are the Loganberry, the Veitchberry, the Foxglove *Digitalis mertonensis*, *Delphinium Ruysii* and *Primula Kewensis*. *Brassica oleracea*—the Cabbage, Brussels Sprouts and Cauliflower group of *Brassica*—has eighteen chromosomes. *B. rapa*, the Turnip group, has twenty. The Swedes (*B. rapa-oleracea*) have thirty-eight (CRANE & THOMAS, 1942–43). The latter are composed of double hybrids from the other two—and so this story could be continued to show how many other plants, including our bread-wheats and oats, have originated in a similar way, how they excel their ancestors, and how these occasional "accidents" in the course of reproduction have bestowed enormous benefits on mankind.

(*To be concluded*)

INVEREWE: A GARDEN IN THE NORTH WEST HIGHLANDS

Mairi T. Sawyer

IT is with some diffidence that I write about my garden here at Inverewe, because I feel my collection of rare plants is very small compared with those of better-known places elsewhere.

During the summer months hundreds of visitors wander through my gardens. Almost everyone expresses surprise at finding them here at all and is amazed to see what trees, plants and shrubs flourish. Having motored, cycled or walked through many miles of peat-hags, bogs and wild rocks, they realize what this estate must have been like when my father, Osgood Mackenzie, bought it in 1862. (Fig. 212.)

He has described the gardens and their favourable position in his book *A Hundred Years in the Highlands*, first published before he died in 1922 and recently issued in a new edition. There he tells how the proximity of the Gulf Stream provides the required warmth and almost entire lack of frosts; and how he could grow, as we still can, many and as good plants at Inverewe in the open air as is possible at Kew under glass. I myself have a feeling that our weather is now more severe than it was even in his younger days, which only bears out his opinion, expressed thirty years ago, that the consistently mild climate here is a thing of the past. Or maybe, having known them for so long, I now feel more acutely the effects of storm and tempest on my beloved trees and plants.

Nevertheless, much can still be accomplished in this remote little corner of Wester Ross, just north of Gairloch. It is interesting how of late more and more people, English and Scots, seem to be settling on our west coast. Some of them buy shooting lodges, others take derelict croft houses and improve them; all, it seems, have an urge to get away from the madding crowd.

Most of those people first become acquainted with this country in the Spring or Summer, and do not realize what gales and pelting rain will come during the rest of the year. The everlasting hills and ever-changing sea are always there, but as time goes on they may feel that a belt of trees for shelter, some attractive shrubs around their home, and an interesting garden would be a great joy. If I can impress on them that with knowledge and perseverence it can be done, as it was here, I shall indeed be glad.

The enclosed ground round the mansion here (usually called "the policies" in Scotland from the old French word "policie") consists mostly of steep braes facing south and west, with the exception of a narrow strip of land down by the shore. On this strip, an old sea-beach, which is the only piece of coastline free from rocks, my father created the orchard and vegetable and flower gardens some eighty-five years ago.

The Inverewe peninsula, whose Gaelic name, Am Ploc ard (the high lump) so aptly describes it, consists of a mass of red Torridonian sandstone, and where the rock slabs were not bare, they grew short heather and still shorter crowberry. The only soil was the rawest, acid black peat, varying from an inch to two or three feet in depth; and much of the peat had been dug out in hollows for fuel by the crofters who occupied the place forty years before my father bought the estate.

There was nothing approaching decent soil on any part of the peninsula, hardly any gravel or sand, but in places there was a jumble of rotten rock. One redeeming feature about what must otherwise have seemed a hopeless situation for planting was that the rock was not solid, but broke up easily, and in places showed veins of pink soft clay. In some places my father had to import soil which he paid an old man to bring in creels on his back.

Because of its exposed position, the Ploc ard catches nearly every gale that blows. With the exception of the thin low line of the north end of Lewis, forty miles away, there is nothing between us and Labrador, and the peninsula is continually being soused with salt spray. The braes above the house are somewhat better, but even they are swept by the south-westerly gales which are so constant and so severe on this coast.

When my father, who had inherited a love of trees and flowers from his father and grandfather, the Lairds of Gairloch, started his planting, there were no trees or shrubs in sight except one tiny bush of dwarf willow, about three feet high. This was always preserved as a curiosity, and I can well remember as a child showing it to visitors.

His first task was to run a deer and rabbit fence right across the peninsula. He always told me that if he had known then the value of the dwarf *Pinus montana* he would have begun by planting a thick belt of them among the rocks just above high water mark, to break the violent squalls of salt spindrift. However, Corsican pine and Scots fir on the outside proved very successful and he was fortunate in acquiring some of the really good old stock of Scots fir, similar to those which grow so resplendently along the shores of nearby Loch Maree and in the fine glens of Locheil.

Thick hedges of *Rhododendron ponticum* were planted, also birch, oak, mountain ash, service, larch, beech and Douglas fir trees. To these were added *Abies Alberti*, *Picea nobilis*, *P. Pinsapo*, *P. lasiocarpa* and *P. Nordmanniana*, *Cupressus macrocarpa* and *C. Lawsoniana*, *Thuja gigantea*, bird-cherries and, in the specially deep nooks, Wellingtonias; these last requiring imported soil.

After about fifteen years had passed, he was so encouraged by the good results that he dotted about Eucalyptus and some of the best natural species of Rhododendron, also *Pinus insignis*, the Monterey pine, of which a very fine specimen grows on the sea-shore in front of the house, with its "toes" in the salt water. I understand that it loves a similar position in its home in California.

All these trees have grown to an amazing size, and twining on many of them to-day are creepers from different parts of the world, including *Billardiera longifolia* from Tasmania, with its wonderful large blue berries, *Berberidopsis corallina*, the coral plant of Chile; *Clematis Armandii*, *indivisa lobata*, *alpina* and *tangutica; Eccremocarpus scaber*, *Hydrangea petiolaris*, (ascending to fifty feet up a larch tree), and other climbers.

In addition to the protection afforded by the trees from the wind and salt spray, they undoubtedly provide a useful canopy for conserving the rain, releasing it slowly so that it does not erode the soil but keeps it permanently moist with a good mulch as well; for it must be remembered that our rainfall here averages nearly sixty inches in the year. It may be

also that the trees help to provide the shrubs and plants with that equability of temperature which is so dear to them. (Fig. 222.)

Many of the trees, of course, not only act as hosts for some of the climbers but also as a background for the shrubs and plants which grow among them. The common silver birch can be particularly beautiful, notably around the rhododendrons, and I am always careful to maintain their trunks by ruthlessly eliminating those which develop too much black bark.

The red Torridonian sandstone, appearing sometimes in large slabs, provides a further pleasing background for the shrubs and plants. In many places it is only too near the surface of the ground so that some of the larger trees have a precarious hold on the shallow soil in which they have their roots.

For those who should visit these gardens, it may be of interest to note some of the plants to look out for. On entering the wrought-iron gateway, the Gate Lodge (1),* seen on the right, has two large *Tricuspidaria lanceolata*, one facing east and one west, intermingled with 'Paul's Scarlet' climbing rose, *Passiflora coerulea*, *Solanum crispum* (autumnal) and *Ceanothus Burkwoodii*.

On the right-hand side of the drive (2) are banks of Hydrangea, *Erica mediterranea*, white and blue Agapanthus (*umbellatus*) (Fig. 218), Yuccas, Azalea (*mollis* and 'Ghent' hybrids) with *Lilium giganteum*. Behind these are very high *Rhododendron arboreum*, *Falconeri*, *fulgens*, *Thomsonii*, 'Elsae,' *oreotrephes*, *Aucklandii*, while here and there among them are *Eucryphia* (*cordifolia* and *glutinosa*) (Fig. 221), Prunus, and Camellias.

One of the Camellias is thought to be a hundred and eighty years old. At the time this estate was bought, there was a sale near by at old Dundonnell House. The aged gardener produced, from a small lean-to greenhouse, a tub containing a small green shrub which he said had never thriven, although it was over eighty years old. My father bought it for a shilling: it flourished and is covered every year with tight rose flowers—very different from the present-day semi-double camellias.

There is one exceptionally high Austrian fir on which a *Clematis montana rubra* has climbed to a height of thirty feet, and when in blossom can be seen from afar, spreading its starry rose-coloured flowers over the flat branches of dark green needles.

On the left side of the drive is a hedge of clipped *Rhododendron ponticum*, over which *Tropaeolum speciosum* ramps, making a blaze of scarlet blossoms and royal blue berries during the months of August and September.

At the back of this hedge is a thirty-six foot drop into the orchard and kitchen garden (19). Against its terrace wall grow various climbing roses, Ceanothus, *Mutisia decurrens*, Correas, Callistemons, *Cassia corymbosa*, Habrothamnus and *Cestrum elegans*.

At the west end of the drive (3) are banks of *Phormium tenax*, *atropurpureum* and *aureo-striatum*, together with *Acanthus latifolius*, *Kniphofia grandiflora*, *Libertia formosa* and *ixioides*. Down the steps, on the western side of the entrance to the kitchen garden (18), before the arched doorway, is a large bed of one of the most striking plants, *Myosotidium nobile*, with its large round leaves of vivid green and huge heads of

* These figures refer to the numbers marked on the plan given on p. 439.

MOOR
N
W
E
S
Camas Glas
Croag Fishing Cottage
Stone near Bridge
PLUCKROD
View Point
LOCH EWE
Good anchorage in 3 fathoms
1
2
3
4
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6
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9
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19

cerulean blue flowers. Although its home is in the far Chatham Islands, off the coast of New Zealand, it is perfectly happy here. I have often told the story of how it never thrived until one day I saw a letter in *The Times* from a sailor who had seen this giant forget-me-not on the shores of the Chatham Islands, growing in rotten seaweed and sharks' carcases. It took little time for me to collect seaweed off the adjacent shore and herring-fry from the ebb-tide; and soon after the plants were surrounded with these, they began to flourish. (Fig. 227.)

On the mansion house itself (4) and the low walls in front are various climbing roses and magnolias, *Myrtus communis*, scarlet *Clianthus magnificus*, *Ceanothus Burkwoodii*, *Ceratostigma Wilmottiana*, *Cydonia* (*Chaenomeles*) *Maulei* and *cardinalis*, *Correa Harrisii*, and *Teucrium latifolium*.

On the south side of the paved terrace runs a curved herbaceous border, then the wide lawn down to a steep slope (5) to the sea. This slope I can hardly call a rock garden, but in its pockets are Alpine Phloxes, Cistuses, and *Dierama pulcherrima* waving above *Campanula bellidifolia* and *Geranium Farreri*. Clumps of *Habranthus pratensis* make a good blaze, beside *Anemone tetrasepala* and *pulsatilla*. (Fig. 214.)

At the lower right-hand corner is a large bed of *Crinum Powelli*, white and rose; whilst *Lewisia Heckneri* peeps out from under big stones, along with *Ramondia pyrenaica*. In the sunniest pocket the lovely *Rhodohypoxis Baurei* holds its own. Alas, it does not grow as I saw it many years ago, in sheets of cherry and white side by side, on a wild hillside of the Drakensberg mountains in Natal. Nothing could have been more beautiful. This bank down to the seashore is a real Russian salad of plants, but it holds a good many treasures.

Passing from the lawn to the west, a path takes one to a small enclosure known by me and my gardeners as "Japan" (6), simply because the first thing planted there was a very good rose-coloured double cherry, which was sent to my father by a friend in Japan. The cherry, now a huge tree, is in the centre of the enclosure, and at both ends are very tall palms, *Chamaerops excelsa*. (Fig. 219.) On one, seventeen feet high, climbs *Mitraria coccinea*, and on the other *Philesia buxifolia* grows quite seven feet up on the hairy stem. The palm does not seem to mind in the least, and certainly the Philesia does very well and its waxy flowers hang charmingly round the trunk.

In this enclosure two eleven foot high tree ferns (*Dicksonia antarctica*) wave their giant fronds (Fig. 217), and there is perhaps the largest *Tricuspidaria lanceolata*, nearly thirty feet high and ninety-three feet in circumference. Below this grow *Lilium auratum*, tree Peonies, Iris, *Fabiana imbricata*, *Calceolaria violacea* (a lovely plant, growing in the form it does here) *Echium fastuosum*, and an immense Kniphofia which grew to over six feet among wild rocks and moss on the hillsides in Natal.

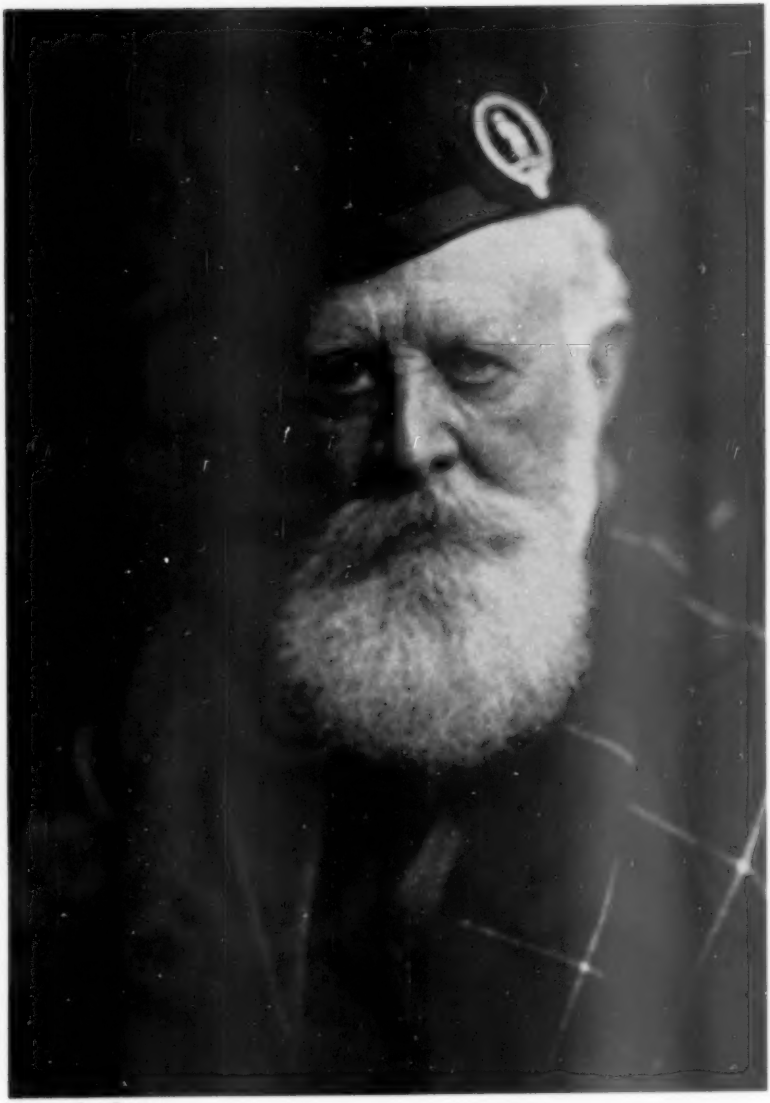
Camassias, American Erythroniums (rose and yellow) and *Narcissus nanus* seem to have taken possession of this corner, for there are sheets out, each in its own time. Returning to the west side of the house (7), below a ninety-eight foot *Eucalyptus coccifera* grows *Phygelius capensis*, also very happy in Ross-shire.

Following the path westwards, one passes beds of *Rhododendron luteum* (*Azalea pontica*), the sweetest-smelling of all, mixed with the

Colour Photo, M. W. Elphinstone, F.R.P.S.

A GARDEN IN THE NORTH WEST HIGHLANDS

Fig. 211—A pond at Inverewe (See p. 441)



Photo, Andrew Paterson

INVEREWE

Fig. 212—Osgood Mackenzie, the author's father, who founded the garden
(See p. 436)

Fig. 213—F. J. Chittenden, O.B.E., F.L.S., V.M.H. (See p. 424)

Photo, R. Adam

INVEREWE

Fig. 214—The garden and view from the front towards the Letterewe Deer Forest (See p. 440)

Photo, R. Adam

INVEREWE

Fig. 215—View looking north from the gardens over Loch Ewe (See p. 441)

Fig. 216 — *Rhododendron sinogrande* (See p. 442)

Photo, P. M. Synge

Photo, H. Adam

INVEREWE

Fig. 217—A tree fern, ***Dicksonia antarctica*** (See p. 440)

Fig. 218 — *Agapanthus umbellatus* (See p. 438)

Photo, R. Adam

Photo, R. Adam

INVEREWE

Fig. 219 — *Chamaerops excelsa* (See p. 440)

Photo, R. Adam

Fig. 220—*Rhododendron campylocarpum* among the birch trees (See p. 441)

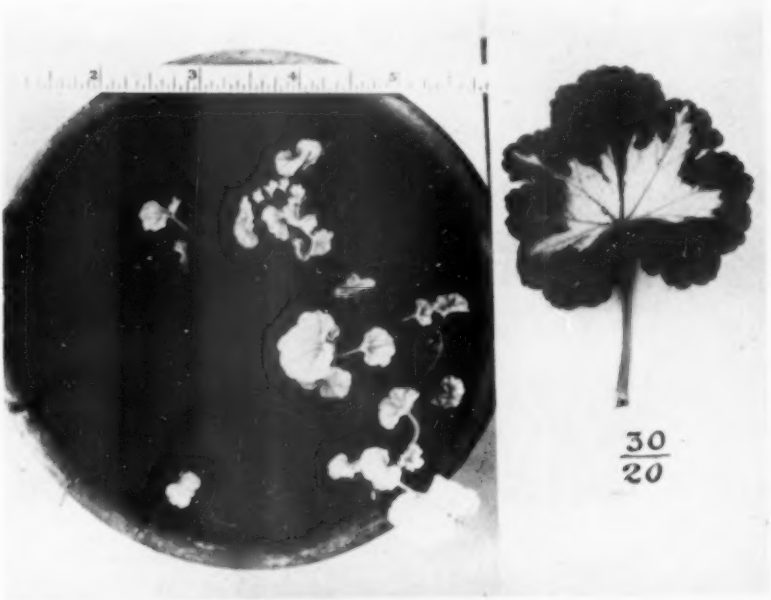
Photo, R. Adam

INVEREWE

Fig. 221—*Eucryphia glutinosa* (*pinnatifolia*) and Hydrangea hybrids (See p. 438)

INVEREWE

Fig. 222—The Inverewe Peninsula from across Loch Ewe showing the growth of trees
(See p. 438)



THE ORIGIN AND IMPROVEMENT OF CULTIVATED PLANTS

Fig. 223—Green over white Pelargonium showing all white root cuttings. The plant has been potted upside down with the roots on the surface of the soil and buds and shoots formed from the roots (See p. 430)

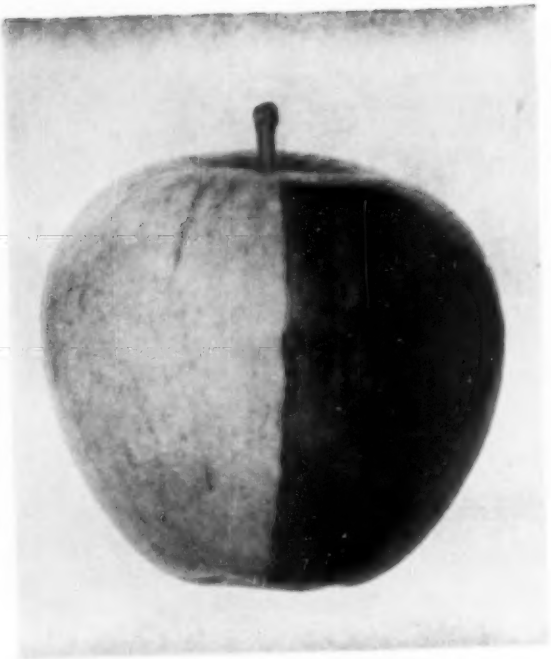


Fig. 224—Apple. On the left-hand side the variety 'Ellison's Orange', on the right-hand side 'Worcester Pearmain' over 'Ellison's Orange'. Arose spontaneously from grafting 'Worcester Pearmain' on to 'Ellison's Orange' (See p. 430)

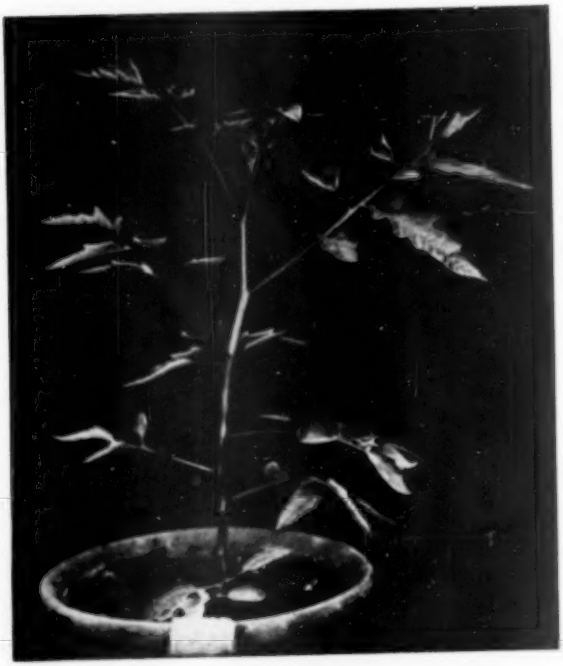


Fig. 225—A deliberately produced chimaera. One layer of *Solanum nigrum* over tomato (After Crane and Jørgensen, 1927) (See p. 430)

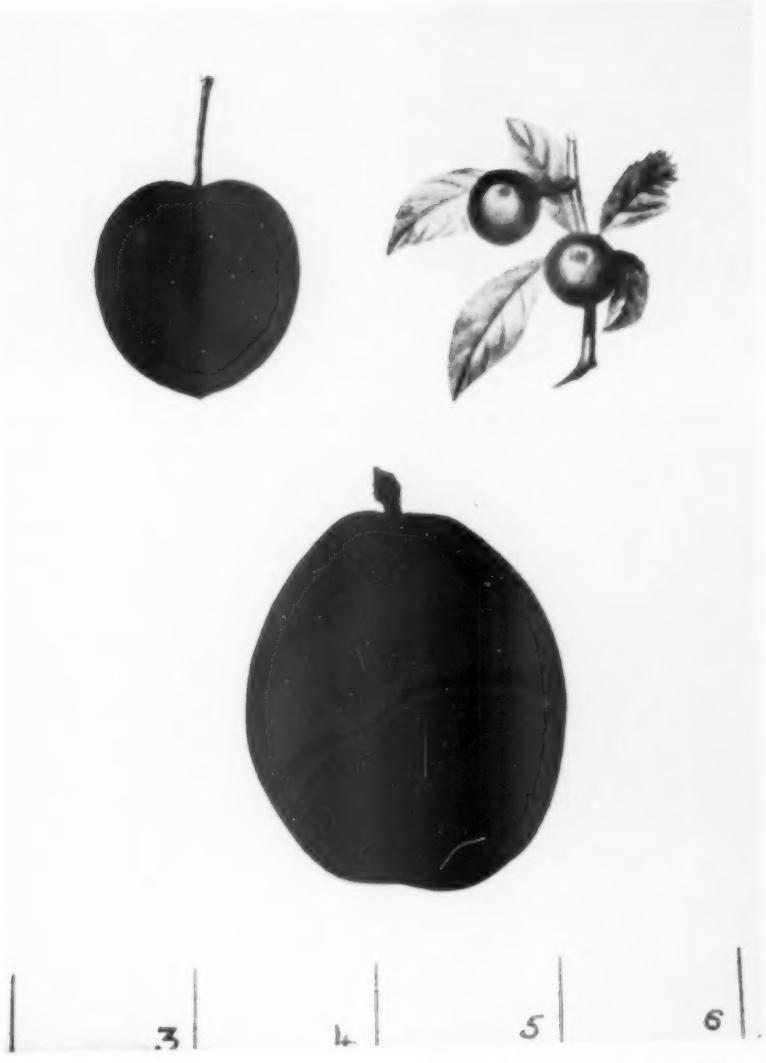
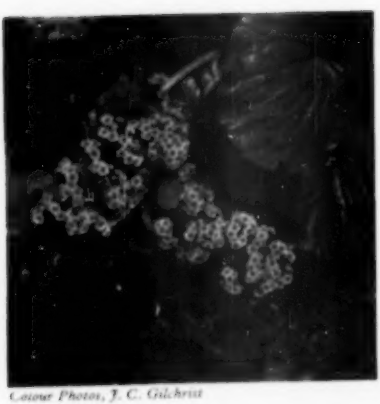
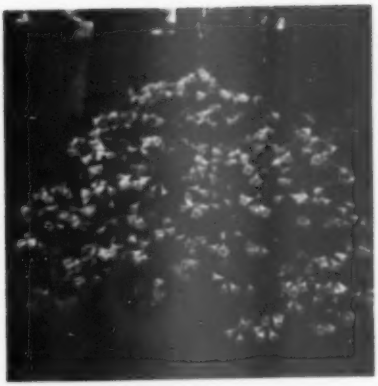


Fig. 226—The origin of the garden Plum. (1) *Prunus cerasifera* (left). (2) *Prunus spinosa* (right). (3) *Prunus domestica* (bottom) (See p. 435)





Colour Photos, J. C. Gilchrist

Colour Photo, M. W. Eiphinstone, F.R.P.S.

INVEREWE

Fig. 227—(top left) *Myosotidium nobile* (See p. 440)

Fig. 228—(top right) Rhododendron 'Countess of Haddington' (See p. 442)

Fig. 229—(bottom) *Watsonia Beatricis* (See p. 443)

Rhododendron 'Royal Purple.' Further along on the left there is a small pond (8), in which a lovely wedgwood-blue Iris (Chinese, I believe), grows right in the deep water. Round this pond are many rhododendrons of great interest, including two *sinogrande*, small compared with the others, but covered with fat buds this year.

On the left of the main path is a natural rock garden (mostly in a face of Torridonian sandstone) which is really only in the making, but promises to be interesting. In front of it is a large bed of *Myosotidium nobile*, and above lots of the Canadian lily, *Lilium pardalinum*, a glorious scarlet, with a groundwork of blue Cynoglossum.

Returning to the main path, various rhododendrons are passed, until one comes to the top of the water garden (10), which is a wild but very lovely mass of Azaleas (*mollis* and Ghent hybrids), *Erica mediterranea*, and *Azalea indica*. Those who wish to see a good view of Loch Ewe and out to the Atlantic beyond can go right on to View Point, on the very top of the Ploc ard.

About twenty years ago there was a very bad south-westerly gale which flattened out the trees on a big piece of ground at the very top. Gradually we got the fallen timber cut and cleared away, and as the surrounding trees were still standing it was proposed to plant the clearing with rhododendrons instead of replacing the forest trees.

People said they would never do on the top of the Ploc ard, so instead of spending money on them we decided to try with our own natural species of rhododendrons, of which we collected about a hundred small seedlings and dotted them about among the heather. They were mostly *arboreum*, *ambiguum*, *barbatum*, *campanulatum*, *decorum*, *niveum*, *sutchuenense*, *yunnanense*, *neriiflorum* and *campylocarpum*. (Fig. 220.) We happened to plant a great many of the latter, and now that most of them are flowering we find some beautiful crosses of *campylocarpum* × *Thomsonii*.

On leaving View Point, a path to the left (Fig. 215) brings one to the big pond (11) (Fig. 211), with its large yellow, pink and red Nymphaeas. *Arundaria nitida* is waving on the peat dam, while scrambling over the water is *Rubus tricolor*, with its luscious golden fruit. To the right, a hillside of Pernettyas (Davise's seedlings) make a groundwork for *Hydrangea paniculata*, *Gunnera manicata*, *Rodgersia podophylla*, and *Osmunda regalis*. On the left, a large clump of very tall *Rosa Moyesii* can be seen.

Among *Olearia macrodentata* and edging the path grow *Funkia undulata*, *argentea variegata*, and *Iris Kaempferi*. Leaving the water garden down a steep slope towards the sea, a long path runs above the shore. High wild rocks rise on the left, and on their wet slabs the lovely little filmy fern has always had its home.

Below the rocks are many kinds of rhododendrons growing under tall white-stemmed birches. *Pyrus Eleyi* and *Sorbus Vilmoriniana* break the monotony, the latter seeding itself very freely after the birds have digested its lovely rose-coloured berries.

Retracing the path northwards, one comes to a small bay called "The Gray Bay" (Camas Glas). Some years ago we planted a lot of rooted cuttings of *Olearia semidentata* here and there in the rocks, and these are now big bushes, covered with their mauve flowers. They prove quite hardy here if put in a dry place.

Further on we come to a rhododendron walk (13). Those of most interest are the very large *sinogrande*, *Hodgsonii* (over 26 feet),' 'Sir Charles Lemon,' and *fictolacteum*. Under these grow the silver-leafed tree-fern from New Zealand, also Woodwardia and *Struthiopteris germanica*.

I measured one of the *R. sinogrande* the other day and found its diameter was 21 feet and its height 22 feet. It seeds profusely on things like fallen trees and old roots. (Fig. 216.)

Going westwards, we pass a *Drimys Winteri* of twenty-five foot growth, and very large *Drimys aromatica*, till we come to the Peace Plot (15), planted after the first World War. This is nearly all rhododendrons, including one immense *Zeylanicum; barbatum*, 'Cornubia,' *Wightii*, *lacteum*, 'Countess of Haddington' (Fig. 228), 'Gibsonii,' *Falconeri*, *Dalhousiae*, *Griersonianum*, *yunnanense*, *eximium*, *neriiflorum*, 'Fragrantissimum,' and many others.

I should remark here on the effects of the frosts in the notorious Spring of 1947, of which we had over 25°. This killed some of the largest *Olearia semidentata;* but it was strange that R. 'Fragrantissimum,' *R. Dalhousiae* and *R. Zeylanicum* were undamaged, whereas *R. ponticum* was blackened extensively, although close by the others. Stranger still, perhaps, was the fact that the local heather, heath and brooms were cut, whereas imported shrubs came out unscathed. My father noticed the same phenomenon in his time and mentioned it in his book.

One possible explanation is that the hardest frosts of 1947, occurring in February and March, came after a particularly mild spell in January. Thus the sap of the species may have failed to respond so rapidly in the earlier month. The native shrubs and plants were then more forward and suffered worse when the frost descended.

During that same frost the voles gnawed and ring-barked some Syringa (lilacs) and also a Cordyline. I had more or less given up the trees for lost but having some deer fat left over in my larder, which was no more use for cooking, I smeared it thickly round the ringed bark of the lilac trees. Although the supply of sap appeared to have been completely cut off by the voles, the trees appear now to be recovering and give us every hope of blooming again shortly.

From the Peace Plot we pass into an enclosure which to me is perhaps the most interesting part of the gardens; it is certainly the most sheltered. There are six different Eucalyptus trees of immense size. Those which are found to be perfectly hardy here are *Gunnii*, *Whittinghamensis*, *coccifera*, *cordata*, *coriacea*, *corrigera* and one or two more. They all came through the 25° of frost in March 1947 without a scar. Although my father warned against it in his book *globulus* seems to do very well and indeed is the one I admire most, as its young growths are such a lovely silvery grey.

Among the tallest trees are *Aristotelia racemosa*, *Myrtus Luma*, *Plagianthus Lyalli*, *Guevina Avellana*, *Gordonia pubescens*, and several Pittosporums—*tenuifolium* being, I think, one of the most attractive. The huge Guevinas have the most wonderful foliage. There is a large bush of *Buddleia auriculata*. In February some friends came into my smoking room, sniffed the air and said, "Chanel No. 5!" I said "No, but a bowl of *Buddleia auriculata*."

Then we come to Magnolias. *Campbellii* (perhaps the king of all—37 years old and over 35 feet high) has hundreds of big buds almost ready to burst and make a wonderful rose contrast against a blue March sky. *Magnolia stellata*, said on good authority to be the largest known—quite 28 feet high and 75 feet in circumference—will soon be a sheet of white, also several others. They none of them flowered really freely until I began to give them all the wood ash I could find. *Davidia involucrata*, here a very shy flowerer, *Embothrium coccineum*, *Osmanthus Delavayi*, *Abutilon vitifolium*, and some of the newer Camellias are also here.

This enclosure we call "Bambooselem," (16) because it was one of our first plantations of bamboo. When kept under control, which is not so easy, some bamboos are very decorative. When planting, we find a deep three foot ditch round them is advisable.

In the spring under these trees and shrubs are sheets of Leucojums, Scillas, various Galanthus, Narcissus (*nanus* and *cyclamineus*) and in the autumn Astilbes and *Gentiana asclepiadea*, *sino-ornata* and *Farreri*.

On each side of the path leaving this enclosure and facing south, we pass (17) big flowering Cherries, pink and yellow, and under them masses of Hydrangeas, till we come to the top lawn above the house. The Hydrangeas range in all shades from intense prussian blue until in November and December they slowly change to the most beautiful ultramarine. To maintain the depth of colour each year I find that every nine or ten years a fresh supply of peat has to be provided or they become paler and paler.

Round the top lawn are beds of heaths, azaleas, lilacs, Kniphofia, and *Dianella tasmanica* with its lovely turquoise blue berries.

There are several kinds of Watsonias, mauve, white and salmon, but there is an outstanding one that does notably well. The seed was sent to me years ago by the courtesy of the Curator of Kirstenbosch, the Botanical Garden of the Cape. Clumps of this flame-coloured *Watsonia Beatricis* (Fig. 229) are absolutely startling and catch the eye of everyone driving up to the house, although quite a hundred yards away. By them are many of the Meconopsis; *Watsonia Beatricis* seeds itself very freely here, and after it has shed its seeds the dry flower stems are very decorative in winter mixed with the dried deep blue heads of Hydrangea.

I should mention another South African flower that flourishes exceptionally well here, *Schizostylis coccinea*, 'Mrs. Hegarty' and above all 'Viscountess Byng.' The latter is far later than the others and stronger growing. It must be admitted that we had hardly any frost this last winter, but I had vases full of the latter till the end of February. When picked in tight bud it comes out in water and lasts quite six weeks. It reminds me of the once fashionable South African flower which used to be sent to this country, Chincherinchee, but instead of a dull white, the Schizostylis is a lovely rose pink.

I am forever developing my garden and trying out new things, so far as means will allow. In conclusion, perhaps I should look back on the mistakes we have made here—probably many more than we realize. If I were going to start a garden all over again in this district, I should avoid *Rhododendron ponticum*, and make instead hedges of *Griselinia littoralis* and *Escallonia langleyensis*. The last is very satisfactory. The

Griselinia seeds itself very freely, but it grows quickly and loves wind, and people are often glad to have the seedlings, whereas few want the thousands of *Rhododendron ponticum* which one has to grub up. *Olearia Hartii* is also very good, being very resistant to salt spray and all kinds of bad weather.

I would also recommend those who are planting good Rhododendrons to put them at least twelve feet apart and let them each grow into a single large bush. This saves a lot of labour in shifting them later on.

A few years ago a great horticulturist visited us here, and I felt extremely shy of letting him see my garden, apologizing for its unkemptness. (I knew that he had about fifty gardeners, while I had only two and a half!) However, he said "Don't alter it, it is lovely and reminds me of a wild bit in Burma or Northern China."

PLANT COLLECTING IN THE MOUNTAINS OF ANDALUCIA

Vernon H. Heywood, B.Sc.

PART I

(*Based on a lecture given to the Society on October 4, 1949*)

THE following notes do not claim to be a report on the expedition I had the privilege of making, together with MR. PETER H. DAVIS, to Spain in 1948 on behalf of this Society; such a lengthy and technical document could scarcely be accommodated in these pages. But it is my purpose to select for discussion some of the plants we collected, whether for their intrinsic beauty or because of the circumstances connected with their discovery, and to describe some of the lesser known areas of Spain which we visited.

Seeds were collected of over 180 different species as well as bulbs and corms of 15; these are in the main being grown at the Society's Gardens at Wisley and at the Royal Botanic Gardens of Kew and Edinburgh. We also made about 1,000 herbarium gatherings that are being divided between the herbaria of the British Museum (Natural History), Kew and Edinburgh.

The word Andalucía in the title of this paper requires some explanation: as events turned out we were practically confined to this area of Spain for the greater part of the expedition. Andalucía typifies the Spain of the imagination—"the artist's dream come to life" as the tourist posters run—but there exists in many minds a vagueness as to exactly where and what this pleasant-sounding place is.

We have to turn to geology for a precise definition, and geologically speaking there are two Andalucías—an European and an African separated by the valley of the Guadalquivir (ancient Betis). The lands to the north of this valley constitute European Andalucía which is terminated by the Sierra Morena (itself forming the southern elevated wall of the Meseta); to the south of and including the Guadalquivir, or Betic,

depression lies African Andalucía, the bulk of which is made up of the Betic Cordillera, a complex system of mountains which runs from the Cabo de la Nao to Cadiz. These mountains, which are divided by a fault (fault of the Genil) into a northern essentially calcareous and a southern predominantly crystalline series, were our hunting ground for nearly three months.

A low humidity has the effect of making the extreme Andalucían temperatures (shade maxima around 110° F.) not excessively uncomfortable, and the slight rainfall in the same period, excluding occasional thunderstorms, simplifies the process of plant-collecting.

We left England in mid-June, and after travelling overland through France by train we arrived in Madrid, parting company (one might say inevitably) with our flower presses and other baggage on the way.

During our enforced stay in Madrid, awaiting our strayed luggage, we made one excursion to the hills around the city—to royal Aranjuez by the Tagus, site of the palaces and gardens of the Spanish crown. The gardens are now poorly cultivated but tall Planes and Cypresses still shade the brown landscape. It was here that Philip II planted noble avenues of Elms (*Ulmus nigra*) introduced from England; but we did not stop to admire—our interest lay in the chalk flora of the nearby hills.

There is something unusually interesting about the flora of chalk, even in this floristically impoverished country of Britain: one always gets the impression that the species are so much more interesting and stimulating than is usual. It is certainly true that many of our rarest and most beautiful plants are calciphiles.

We took the cart track leading from the dusty town to the Mar de Antigola—an inland lake. *Eryngium campestre* and a violet-flowered Crucifer were the first plants of the expedition, and soon on the gypsum declivities masses of yellow *Helianthemum*, golden *Calendula*, white Thyme, purple *Matthiola* (*M. tristis*), and lilac *Calamintha* made us stop to fill the presses. Seed was collected of an *Iberis* which made bushes, a foot and a half tall, of velvety leaves. We are told it is *I. subvelutina*, a highly desirable plant with rose-pink or white flowers (there were none for us to see) which is confined to these dry hills near Aranjuez but appears again, according to the *Prodromus*, near Córdoba in Andalucía. *Frankenia Reuteri* grew here; it is a densely caespitose pink-flowered form—' the most elegant of all the species' is Willkomm's comment. Prominent on the hillside was *Reseda suffruticosa*, a magnificent giant among Mignonettes which was for long confused with related species; an annual, it dwarfed the surrounding vegetation with its 4-foot spikes of white flowers rising from thick dissected papillose leaves. There were other Mignonettes here, probably *R. Gayana* and *R. ramosissima*, but they were quite commonplace. The pale lilac buds of *Limonium divaricatum*, clustered in long pyramidal panicles, were beginning to open in damp hollows where it was locally abundant. Other notable plants of this halophytic community included the rather rare and beautiful var. *minor* of *Hedysarum humile* with bright pink-purple Pea flowers, and *Lepidium subulatum* covered with profuse white crosses.

After a few days our flower presses reached Madrid and we took a south bound train en route for Cazorla, over the tableland of the Meseta and through the pass of Despeñaperros to Baeza. Cazorla has no railway station, or at least the Cazorla-Los Propios halt which serves it is 15 miles from the town; one has the choice of leaving the train at Los Propios and hoping there will be a lorry the same day for Cazorla, or, as we did, of staying on till Baeza which is an uncomfortable junction, connected by *tranvia* with Ubeda. From Ubeda a bus leaves for Cazorla, but having failed to get our luggage accepted on the first *tranvia* we had to wait some hours for the second: consequently we missed the bus at Ubeda. But we struck a bargain with a lorry driver and were violently conveyed to Cazorla.

The road ran through an undulating countryside planted here and there with wide groves of Olives; the violet and blue hues of the evening light cast their shadows on the trees, turning the brown landscape into a vast stepped amphitheatre. Soon the glimmering lights of Cazorla could be seen; the road climbed to meet them and the lorry stopped at the *fonda* in the square and dropped us.

In an earlier article in this JOURNAL* I described briefly a three days' trip in the Sierra de Cazorla; last year (1948) we decided to make an extensive exploration of these mountains because of their paramount horticultural and botanical interest.

Cazorla, as will be realized from what is written above, is a dead end: beyond it lie the mountains. Largely due to the lack of authoritative maps it has become customary to apply the name Sierra de Cazorla, erroneously, to all of the mountains of the State of the Sierra de Cazorla of which it in fact forms part. Details would be superfluous here but in summary form the Montes de Cazorla† consist essentially of three separate lines of peaks—the western outer Sierra de Cazorla, the central Sierra del Pozo Alcón and the eastern Sierra de la Cabrilla.

The climate is characterized by a minimal summer rainfall—36 mm. in June-August, being 5 per cent. of the annual total—and high mean and maximum temperatures varying from 8·5–12° C. and 32–38°C. respectively. We were favoured all the time with fine and warm weather although morning mists were extremely dense at high altitudes.

At the Cueva de la Magdalena in the Peña de Alcón Cazorla's celebrated troglodyte *Pinguicula vallisneriifolia* was still in flower hanging suspended from the tufa roof and walls of the cave. The biology of this Butterwort requires investigation for plump seeding capsules were rare and what seed we did collect failed to germinate although hurried by airmail to Wisley. Short of bringing the plant back alive embedded in its native rock, I see no certain way of securing it for cultivation.

The various formations around and below the Cueva were strikingly rich: on the dry rocks *Potentilla caulescens* var. *villosa* was dominant (as it is on similar exposures throughout this region) with associates including *Sarcocapnos enneaphylla*, frail and curious, with rounded dark green leaves and white flowers centred with yellow; the neat saxatile clumps

* "Through the Spanish Sierras." *R.H.S.*, **73** (8), 257–266 (1948).

† A convenient abbreviation of their full title, Montes del Estado de la Sierra de Cazorla.

of *Teucrium rotundifolium* (*T. granatense*) whose flowers open a lacteous-white, later fading pale purple; and *Globularia spinosa*.

The *Globularia*, which, according to SCHWARZ's monograph of the genus should be typical *spinosa* in this area of Spain, is very unlike the plant known in cultivation. In habit the Cazorlan plant is very robust, forming thick woody root-stocks with numerous spiny rosettes from which arise strong peduncles varying in length from 6 inches to over a foot (the latter height is most common). Only on the limestone slopes of the Cuerda de las Moras did the *Globularia* show much resemblance to the cultivated plant. There the flowering stalks were very dwarf and the rosettes small and few.

Below the Cueva on the chalky-sandy hills grew a twiggy thyme-like plant with short linear leaves and conical spikes of purple flowers; not until we returned did we identify this intriguing form as *Coris monspeliensis*, an anomalous member of the *Primulaceae*. It has been previously in cultivation but seems in most parts to have died out.

Because of the great development of forests these mountains are well provided with roads connecting the numerous Casas Forestales with the town. On June 25 we drove with our guide, Juan Garcia, to the Casa Forestal at la Nava de San Pedro (1,290 m.) which we made the centre of our operations. The Forest Station of San Pedro, the most important in the Sierra, is a strongly constructed building with a suite of rooms for visiting forest officers, and we were installed in these in great luxury.

Shortly after arriving we climbed the limestone peak known as the Cabeza del Tejo and Pico de Gargantas. The path led through forests of Pine where the ground species included *Scabiosa tomentosa*, *Aphyllanthes monspeliensis*, and *Helleborus fœtidus*, the latter being widespread in this area and almost invariably parasitized by an *Orobanche* with reddish-brown flowers. Further afield in the Serrania de Ronda and Sierra de Grazalema the Hellebore was frequently found in association with apparently the same species of *Orobanche*.

On climbing out of the *Pinetum* to the limestone slopes of the Cabeza del Tejo we found in the north-facing rocks a rich community of alpines at about 2,000 m. comprising notably *Globularia spinosa*, *Erodium cheilanthifolium*, *Linaria anticaria*, *Saxifraga Rigoi*, *Draba hispanica* and a variety of *Arenaria armerina*. The plants of *E. cheilanthifolium* collected showed considerable variation in colour. Normally the petals were pale-pink with dark lilac veins and the two upper petals blotched, but plants with almost white unblotched petals were seen. The *Arenaria* was a typical example of the curious adaptation of a species to ecological conditions at high altitudes. It resembles *A. tetraquetra* in general habit, differing mainly from this species by its larger pedunculate flowers. The leaves are much more densely imbricated than in *tetraquetra* resulting in more compact mounds with a finer surface; and the silvery-green colour of the leaves gives the whole plant a stone-like appearance.

We descended the pine-covered slopes to the Barranco de Gargantas where, opposite the Fuente de la Garganta on a rocky outcrop, *Hypericum ericoides* was in bud ; it looked, as its name suggests, like a dwarf

heath. Associated with it were *Anthyllis cytisoides* and *Teucrium rotundifolium*.

Not many people seem aware of the variations in habit shown by *Hypericum ericoides*. All the plants from the Cazorlan mountains belong to the upright form* with small flowers unlike the fleshier, larger-flowered plants collected between Alcoy and Jijona (prov. Valencia), and quite distinct from the prostrate variety, as yet unnamed, from Porta-Coeli, near Valencia, and (according to the late DR. GIUSEPPI) from the cliffs by the roadside not far from Almeria.

In stony places near the Rio de Garganta a surprising find was *Dictamnus Fraxinella*; the plants were by no means typical—the flowers were a vivid lilac with darker veins on the upper petals, and the anthers green. Although the identity of our plants was checked in Madrid it is worth noting that REVERCHON collected *D. hispanicus* and LACAITA *D. albus* var. *purpureus* from the Sierra de Cazorla but the status of these forms is in need of revision.

On a later day we set off with mules for the Casa Forestal at the Nava de San Pablo. Our route took us through the Barranco de Guadalentin which is well wooded in part and supports a rich ground flora including *Paeonia Broteri*, *Lonicera splendida* and *Verbascum Hervieri*. Altogether we collected at least six distinct species of *Verbascum* in the Montes de Cazorla; of these *V. Hervieri* is the most distinct. The rosette leaves are very large and silky and the flowering stem is more or less naked and solitary, branching above into a striking pyramidal inflorescence bearing yellow flowers singly. The plants (in fruit) may reach up to 10 feet in height and a single specimen fills a flower press. A peculiar feature of *Verbascum Hervieri* is the absence of thick woolly indumentum, typical of other species, on the flowering stems which are here quite glabrous and a shining mahogany colour.

By the Rio Guadalentin a *Narcissus*, in fruit, was locally abundant; it was a tall species ranging from 2 to 4 feet with glaucous, more or less twisted leaves. The peasants called the plant 'Nardos Favoles,' and it seemed probable that it was *N. longispathus*, a new species described from the Sierra de Cazorla by PUGSLEY; but when our Cazorlan bulbs flowered in this country they did not agree with PUGSLEY's description nor did they retain their field characteristics. The spathe of the cultivated flowers was only 2–3 cm. long instead of 8–10 and the plants themselves were only 20 cm. tall. The problem awaits a solution.

We arrived in good time at the Casa Forestal of San Pablo which lies in a wide depression at the top of the Barranco de Guadalentin. It is the highest of the Cazorlan forest stations and is a good centre for excursions to the Sierra de la Cabrilla and Los Organos.

Above San Pablo we came to an alpine lake, evidently the result of a tectonic depression, for, towards the margins, jagged stumps of submerged trees were jutting out. At the far end of the lake we gradually ascended to the Fuente de la Umbria and soon approached the pinnacles of Los Organos—*locus classicus* of the rare endemic *Ptilotrichum Reverchonii*. A stream which flows over the highlands towards the base

* This is the form in general cultivation in Britain—collected by DR. P. L. GIUSEPPI in the Sierra de Cazorla.

of the peaks is known as *Aguas Negras* (Black Waters), but at the breath-taking precipice it cascades down the gorge to form the Rio Borosa in the valley below. In 1947 I climbed down to the foot of the gorge searching for *Ptilotrichum Reverchonii* with indifferent success, but this year I explored the 'organ pipes' above and found the rare Crucifier in abundance along with *Sarcocapnos crassifolia* var. *speciosa* (by far superior to *S. enneaphylla*), *Saxifraga Camposii* and *S. Rigoi*, *Erinus alpinus* var. *parviflorus* and *Viola cazorlensis*.

Naturally *Viola cazorlensis* was much in evidence throughout our excursions; not always did it grow where and how we expected. On the Pico de Cabañas, Sierra del Pozo Alcón at 2,000 m. the *Viola* leaves its customary rock fissures, which it occupies at lower levels, and grows in the loose calcareous summit screes with *Juniperus sabina* var. *humilis*, *Convolvulus nitidus*, *Erinacea Anthyllis*, *Thymelaea granatensis* and others. In this locality the *Viola* forms small poorly developed plants showing great variation in colour, size and shape of flower—carmine to pale pink, blotched with intense carmine or immaculate. Seeds of an albino form were collected from this locality in August 1948.

The departure of chasmophytes from crevices to screes and loose rocks, above certain altitudes, seems to be not unusual in the Mediterranean region.

When we returned in the afternoon to San Pablo, the masses of *Helianthemum*, which in the morning had been covered in yellow flower, had dropped all their petals to gild the ground. Nearby, the short grassy turf looked promising for bulbs and, as soon as we had unloaded the mules, we went out again to investigate. We were in luck, for in a few minutes we had found a dwarf *Narcissus* and two Tulips (mixed with a *Colchicum*!) all in fruit. The *Narcissus*, well known to the forester as being the first flower of spring, was a tiny species growing only 1–2 inches tall. We collected bulbs which flowered in Sussex on Christmas day, at Wisley a few days later and at Edinburgh in mid-February. These were identified as *Narcissus hedrianthus*.

Narcissus hedrianthus is a rare species previously known only from the type gathering; it is related to, although outwith, the *N. Bulbocodium* complex. In horticultural circles it has attracted considerable attention and a paper giving fuller information is in preparation.

The succeeding day took us through the rather uninteresting Barranco de Ginez and up a long gentle slope to the approaches of Las Empanadas, peak of the Sierra de la Cabrilla. Las Empanadas is a disappointing peak. On the lower slopes grow a few stands of *Pinus Clusiana* and above that a scrub of dwarf Juniper giving the rounded dome a bare appearance like the mountains to the east. From about 1,800 m. a formation of spiny cushion-forming xerophytes—*Erinacea Anthyllis*, *Ptilotrichum spinosum*, *Astragalus* spp.—was dominant. In the dry grey scree *Pyrethrum spathulifolium* appeared occasionally all the way up to the summit; *Convolvulus nitidus* was quite frequent in full flower along with *Erodium cheilanthifolium* and on the summit itself *Arenaria tetraquetra* var. *frigida* associated with *Ptilotrichum spinosum*. The flowers of the latter at this altitude were frequently pink or pale-purple instead of the usual white, a phenomenon also observed in the

plants of *P. spinosum* at about 2,000 m. in the Sierra Nevada below the Peñones de San Francisco where I collected seed in September from plants marked in July.

The view from Las Empanadas is impressive: to the west the crests and valleys of Cazorla, sometimes grey, sometimes dark green with Pines, stretch for miles; to the east beyond the dry slopes of the Sierra Seca (S. de Castril) lie the gaunt uninviting ranges in the north of the province of Granada, and the nucleus of the Sagra.

To the south the Sierra de la Cabrilla is prolonged into the Poyo de la Carilarga—a long range of mountains which have to be attacked from a rather dangerous goatpath which leads along below the sheer limestone walls. The substrate is mainly a loose chalky rubble and difficult underfoot. Among the few chasmophytes we had time to collect here was a tiny Campanulad with flowers in heads but unfortunately still in bud. When I returned to Cazorla in August this plant was in flower—it was *Jasione foliosa* subsp. *minuta*, a very delicate blue-violet-flowered relation of the sheep's bit scabious. Later I collected it in several other localities in these mountains. A study has been made by Spanish botanists of *Jasione foliosa* and it concluded that the Andalucían plant (from Sierra Tejeda, S. de la Nieve, S. de Yunquera, S. Maria, Macizo de Magina, etc.) represents a subspecies of the type of Cavanilles from the kingdom of Valencia (S. de Mariola, S. de Aitana). The most apparent difference of the Andalucian plant is its nearly spoon-shaped (not spathulate) leaves, although other characters separate the two forms. It is very difficult to find this species in the rock fissures as it forms such tiny rosettes and flowers in late August.

Our final journey from San Pablo took us back to Cazorla by a devious route: along and down the banks of the Rio Guadalentin which wound through the Styx-like gorge of the Cerrado Utrero we rode, later crossing the river at a well constructed bridge, guarded by an armed *vigilante*. Gradually we climbed up wooded slopes, the haunt of wild mountain goats, through a *Rosmarinetum* (mainly *Rosmarinus officinalis* and *Teucrium* spp.) to the Casa Forestal at the Fuente de la Yedra (Fountain of Ivy).

Early on the morning of July 1, with thick mist shrouding the surrounding mountains, we left La Yedra to climb the Pico de Cabañas (2,027 m., peak of the Sierra del Pozo Alcón). The high mountain path lead through forests of *Pinus Clusiana* in which we collected *Chamaepeuce hispanica*, *Catananche coerulea* and an apparently new species of *Verbascum* with ivory-white corollas faintly shaded with pale greenish-apricot. It was a biennial grey-leaved plant, simple or unbranched, and just coming into flower. We found the same species later at the Fuente del Tejo, but at neither locality was it common.

Passing on the way an ancient gnarled specimen of *Taxus baccata*—the first we had seen, and the only one we were to see—we reached the spot known as Cabañeros, not far from the Fuente Cabañela where we left our muleteers and set out to climb the Pico de Cabañas with our guide.

On the summit is a tiny shelter where a *vigilante* keeps a lonely watch. From this height the village of Pozo Alcón can be seen in the

far distance at the end of the wide valley of the Rio Guadalentin. Below the peak there is a curious limestone arch around which we collected several plants of interest: *Jasione foliosa* subsp. *minuta* in many of the crevices, and an occasional white-flowered form, a dwarf *Geranium* with white flowers veined with violet and resembling a saxatile *Erodium* in habit, and a blue-flowered *Aquilegea* 6 inches high. On the slopes below the arch we dug up a dwarf *Narcissus* which was growing through dwarf Juniper. Bulbs brought back have flowered and been identified as *N. rupicola* by the Narcissus Committee; but the plants are by no means typical and show considerable resemblances to *N. calcicola* from Portugal. It is interesting to note that Cuatrecasas records *N. jonquilla* from the Macizo de Magina, having previously called it '*N. rupicola* Duf. for. vel var. *pedunculata* in sched.—a typo floribus pedunculatis, non sessilibus, pedicellis 3–12 mm. long. perigonii tubo breviore, discrepat.' This differentiation applies equally well to our plants.

We climbed down to the opposite slopes of the Cabañas, collected our mules and rode off to the Casa Forestal at La Cañada de las Fuentes (Glade of Fountains) where the forester joined us as far as the sources of the Rio Guadalquivir. Further on we crossed the young river and took to the mountain path reaching Rasos Nuevos, which stands at 1,190 m., in the early evening.

The last stage of our journey took us to the Vertientes de Gualay and past the Cueva de Lorno where we collected the rare *Ptilotrichum longicaule* in flower—' depressed heaps . . . flopping boughs of a foot or two in length . . . frail stems carrying showers of white blossom,' is FARRER'S fanciful description—and climbed into the mountains of Navahondona, reaching San Pedro by mid-afternoon. We covered the last miles to Cazorla in a lorry, stopping at the historical Puente de Herrerias (Bridge of Forges); according to tradition, it was built by Isabel the Catholic during the pursuit of the Moors hiding in these retreats.

While our lorry was being loaded with Pine planks from the Sierra, we looked at the plants growing near the bridge and by the banks of the Guadalquivir which it spans. It was a change to find a mesophytic and hydrophytic flora here after the predominance of xerophytes in the mountains. Species pressed included *Trachelium coeruleum*, *Anagallis tenella*, *Ruscus aculeatus*, *Buxus sempervirens* and *Samolus Valerandi*.

A bumpy journey along the forest road past the outer peaks of the Sierra de Cazorla, through La Iruela, and we rattled tired and dirty into Cazorla where we found that the village's water supply had run out!

On our last excursion from Cazorla we left by the road to La Iruela and at a short distance from the town took the goat path which leads up the mountainside to the Caballo del Prado Redondo with the Peña de Alcón, the peak which dominates Cazorla, on the right and the castle of La Iruela on the left.

In the rocky crevices of the first crests of the Prado Redondo *Viola cazorlensis* was found frequently with a rich consort of *Jasione foliosa*

subsp. *minuta*, *Salvia lavandulifolia*, a rather attractive purple-flowered species, *Globularia spinosa*, still showing some colour and *Erinacea Anthyllis*. The *Viola* forms extensive colonies here and flowers several weeks earlier (it was in young fruit on July 4) than in the more elevated localities such as the Cerro Cabañas.

Further east on the Cuerda de las Moras and the summit of the Prado Redondo, the long-overlooked treasure of the *Dipsaceae*, *Pterocephalus spathulatus* is a memorable sight. Here on the hot summit screes of smooth white Jurassic chalk it appears to attain its ecological optimum, forming a distinct association with *Convolvulus nitidus*, generally accompanied by *Fumana procumbens* and an unidentified *Helianthemum*. This remarkable xerophytic community is strictly localized, but where developed forms extensive silvery-white mats. The *Pterocephalus* may cover the limestone for several yards to the exclusion of all other plants, or, as is more usual, it forms the above mentioned association with *C. nitidus*.

Along the crests of the Prado Redondo, within the dominion of the *Pterocephalus-Convolvulus* association, the most typical species were *Erodium cheilanthifolium*, *Helianthemum frigidulum* (?), *Arenaria tetraquetra* var. *frigida*, *A. armerina* var. *elongata*, *Teucrium capitatum*, *Globularia spinosa* and *Linaria aeruginea*, all combining to form a near perfect rock garden.

In the steep south-sloping sunbaked screes overlooking the Cañada del Tejo and Cañada de la Magdalena *P. spathulatus* shows its maximum development in size. The individual plants are as much as 10–12 inches across and the flowers show variation in colour from dark to pale pink. Few species can accompany it in such a specalized habitat—only the *Convolvulus* and *Fumana procumbens* and a white-leaved, yellow-flowered *Centaurea* were noted.

This incredibly beautiful Dipsacad is having mixed fortune in cultivation. The plants which last year prospered in ordinary soil in the rock garden at the Royal Botanic Garden, Edinburgh, have since inexplicably disappeared. But at Wisley a host of healthy young plants have been raised, and perhaps we may dare hope for some flowers next summer.

After descending to the Fuente del Tejo where we had lunch, we followed the mountain path to the Iruela-Cazorla road. On the rocks below La Iruela we collected *Campanula mollis* var. *giennensis* and *Potentilla caulescens* var. *villosa* which grew in profusion on the limestone cliffs. Then we guided our mules for the last time into the *plazeta* of Cazorla.

A second halt was made in Granada. The city stands about 2,180 feet above sea level and the mountains rise up above it to 11,400 feet. One can if desired make the ascent by taxi following the highest mountain road in Europe. We did not.

(*To be concluded.*)

Editor's Note—It is hoped to publish some photographs to illustrate this article with the second part in December.

PLANTS TO WHICH AWARDS HAVE BEEN MADE IN 1950

Chrysanthemum 'Cotswold Gem' F.C.C. August 15, 1950, as an early-flowering disbudded variety for market. Flowers white. Described JOURNAL LXXIV, p. 422 (A.M. 1948). Raised by Mr. W. Avery, shown by Colham Green Nurseries Ltd., Hillingdon, Middlesex.

Chrysanthemum 'Deep Red Sweetheart' A.M. August 1, 1950, as an early-flowering disbudded variety for exhibition and market, a sport from 'Sweetheart.' Flowers of reflexed type, 5 inches diameter, a deep dull shade of crimson red. Shown by Colham Green Nurseries Ltd., Chapel Lane, Hillingdon, Middlesex.

Chrysanthemum 'Foremost' A.M. August 15, 1950, as an early-flowering disbudded variety for exhibition and market. Reflexed type with fine deep solid flowers, 5 inches diameter; outer petals slightly curled at tips; light reddish bronze on a base colour of golden buff, reverse gold; stems 20 inches long; foliage medium size. Raised and shown by Messrs. J. & T. Johnson, The Nurseries, Tibshelf, Derbyshire.

Chrysanthemum 'Golden Sweetheart' A.M. August 1, 1950, as an early-flowering disbudded variety for exhibition and market, a sport from 'Sweetheart'. Flowers of reflexed type, 5 inches diameter, a deep golden amber. Shown by Colham Green Nurseries Ltd., Hillingdon, Middlesex.

Chrysanthemum 'Orange Sweetheart' F.C.C. August 1, 1950, as an early-flowering disbudded variety for exhibition and market, a sport from 'Sweetheart'. Flowers of reflexed type, 5 inches diameter, rich bright orange, reverse of petals gold. Shown by Colham Green Nurseries Ltd., Chapel Lane, Hillingdon, Middlesex. (**A.M.** 1949.)

Chrysanthemum 'Rearlight' A.M. August 15, 1950, as an early-flowering disbudded variety for exhibition and market. Reflexed type with fine solid flowers, 5 inches diameter; deep rich chestnut crimson with gold reverse; stems 18 inches long; foliage medium size. Raised and shown by Messrs. J. & T. Johnson, The Nurseries, Tibshelf, Derbyshire.

Chrysanthemum 'Salmon Sweetheart' F.C.C. August 1, 1950, as an early-flowering disbudded variety for exhibition and market, a sport from 'Sweetheart'. Flowers of reflexed type, 5 inches diameter, soft cream pink flushed salmon with pale gold reverse. Shown by Colham Green Nurseries Ltd., Chapel Lane, Hillingdon, Middlesex. (**A.M.** 1946.)

Chrysanthemum 'Yellow Sands' A.M. August 15, 1950, as an early-flowering disbudded variety for exhibition and market. Reflexed type with large fine flowers. Majority of petals incurving and fairly regular; solid petals; colour a good rich yellow; stems 22 inches long; foliage medium size. Raised by Messrs. H. Shoesmith Ltd. and shown by Mr. John R. Bell, Southdown Nurseries, Horam, E. Sussex.

INVITED TRIALS, 1951—To be judged in 1951

Vegetables

Carrots (early, maincrop and late varieties)
Maincrop Peas
Cauliflowers (early varieties to mature not later than All Year Round)
Outdoor Tomatoes
Parsley

Flowers

Michaelmas Daisies (Perennial Asters)
Nemesia
Phlox Drummondii
Perennial Phlox
Iris sibirica (planted in 1949)

Preparation for Invited Trials to be judged in 1951

Vegetables

Carrots, 1 oz. of seed of each variety Peas, maincrop varieties, ½ pint of seed of each variety Cauliflowers, ½ oz. of seed of each variety Tomatoes, outdoor, 150 seeds of each variety Parsley, 1 oz. of seed of each variety	Entries to be received at Wisley not later than January 31, 1951

Flowers

Nemesia $\frac{1}{16}$ oz. of seed of each variety *Phlox Drummondii*, $\frac{1}{16}$ oz. of seed of each variety	Entries to be received at Wisley not later than January 31, 1951
Michaelmas Daisies Perennial Phlox	Three plants of each variety to be received at Wisley not later than March 31, 1951.

Preparation for Invited Trials to be judged in 1952

To prepare for trials in the Biennial Calendar, some of the seeds and plants are required sufficiently in advance to become established by the time appointed for their consideration by the judges, namely:—

Aquilegia, $\frac{1}{16}$ oz. of each variety Myosotis, $\frac{1}{16}$ oz. of each variety *Papaver nudicaule*, $\frac{1}{16}$ oz. of each variety Polyanthus, $\frac{1}{16}$ oz. of each variety	Entries to be received at Wisley not later than January 31, 1951
Schizanthus, packet of seed to produce 60 plants *Violas (seed only), $\frac{1}{16}$ oz. of each variety	Entries to be received at Wisley not later than June 30, 1951
Iris spuria and its hybrids *Papaver orientale* Pyrethrum	Three plants of each variety to be received at Wisley not later than September 30, 1951

* The trial of Violas includes varieties grown from seeds and from plants. The varieties grown from plants will be asked for in the early spring of 1952.

Plants and Seeds for Invited Trials

Anyone desiring to send a variety or strain to an invited trial must obtain from the Director of the Gardens an entry form which must be completed and returned by a specified date. The entrant must certify on the form either

(*a*) that the variety or strain has been raised or developed by him
or (*b*) that the variety or strain was, or is about to be, introduced by him to British commerce.

The entrant must also supply sufficient particulars of the history of the variety or strain to substantiate his certificate, but such particulars will not be published by the Society without the sender's consent.

BOOK NOTES

"Anatomy of the Dicotyledons." By C. R. Metcalfe and L. Chalk, with the assistance of M. M. Chattaway, C. L. Hare, F. R. Richardson and E. M. Slatter. 2 vols. pp. lxiv+1500, with 317 figures in the text. 1950. (Clarendon Press, Oxford.) £6 6*s*. net.

The "Anatomy of the Dicotyledons" is the successor to Solereder's "Systematic Anatomy of the Dicotyledons," of which the English translation, by Boodle and Fritsch, appeared over 40 years ago. The new book is not a revised edition of the older one, although it is based upon much the same plan: the biggest difference is that it devotes a considerable space to the structure of the mature secondary wood or timber and, in fact, forms the first comprehensive systematic survey of wood structure.

The data are arranged on a family basis, the classification being that of Bentham and Hooker. For each family there is generally a summary of the anatomical features followed by more detailed information on the structure of different parts of the plant. There is also a section devoted to taxonomic anatomy and a valuable summary of economic uses.

Apart from the section on economic uses the information which is most likely to interest the horticulturist is that concerned with classification. Floral characters will probably always be used as the main basis for classification of flowering plants, but a knowledge of relationships will inevitably rest on more secure ground if the systematist uses as wide a range of characters as possible. Anatomical characters are likely only to supplement external morphological ones and in general they appear to be more useful in determining the affinities of larger groups, like families, although they sometimes assist with specific determinations.

The new book exceeds the length of its predecessor by some 300 pages and even this limit could be attained only by a more condensed treatment and by the omission of some of the detail found in the older book. It forms an important addition to the literature on morphological botany and as it by no means exhausts its subject it should stimulate further research along similar lines. To anyone engaging in such research it will be indispensable.

F. W. JANE

"Plant Viruses and Virus Diseases." By F. C. Bawden. 3rd ed. 1950 Pp. xv & 335. (Publ. by The Chronica Botanica Co., Waltham, Mass.; Wm. Dawson and Sons Ltd., London, W.C.2). £2 8*s*.

The appearance of a third edition of this well-known book will be welcomed by all plant virus workers. Actually it is, as the author points out in his preface, largely a new book rather than another edition. This extensive revision has been necessary, not so much because of any startling new discoveries, but rather because of steady increases in our knowledge of plant viruses and virus diseases. To write a book of this nature is a severe test of the writer's comprehension of his subject since the study of plant viruses embraces so many disciplines, ranging from entomology to crystallography. Mr. Bawden, however, has succeeded well in this difficult task and has covered the whole field in a lucid and readable manner.

There are seventeen chapters dealing with views on the nature of viruses, external and internal symptoms, methods of transmission, relationships between viruses and

their insect vectors, mutations and strains, the serological reactions of plant viruses—an aspect in which Mr. Bawden is himself interested—quantitative methods of assaying for viruses, purification, chemical and physical properties, crystallinity of viruses, estimation of particle sizes, types of inactivation of viruses, taxonomy, virus diseases and host-plant physiology, control measures and speculations on the origin of viruses. There is a general index and an author index. In an access of modesty the writer has omitted his own name from the author index. This is a pity because he has himself made considerable contributions to our knowledge of the subject.

The book is a handsome one and the illustrations are both excellent and appropriate. Mr. Bawden is to be congratulated on a very good and useful book.

K. M. SMITH

"A Fruit Grower's Diary." By Raymond Bush. Demy 8vo. Pp. 248. Illus. (Faber & Faber.) 12*s.* 6*d.*

This book covers Mr. Bush's diary for the years 1935–1938 inclusive and much of it originally appeared in the *Countryman*, having been started at the suggestion of Mr. Robertson Scott. It is interesting to compare methods and prices to-day with those of 1935. I have enjoyed reading these little pieces. They cover a wide range of subjects and of knowledge and will not only be of interest to the fruit grower but also to the general gardener and the naturalist.

P. M. SYNGE

"South America Called Them." By Victor W. von Hagen. 8vo. 401 pp. Illus. (R. Hale.) 21*s.*

This volume is an industrious compilation, worth reading particularly for the wealth of quotations selected from the letters and writings of the four great naturalists (Charles-Marice de la Condamine, Alexander von Humboldt, Charles Darwin and Richard Spruce) whose adventures and journeyings in South America constitute the main interest of the book.

Victor von Hagen's style is always lively and sometimes picturesque in a breathless, journalistic manner with a leaning towards the turgid and sensational. Thus the first chapter on Richard Spruce ends with this ineptitude, "Once the whole Amazon had been controlled by the God-intoxicated padres; now it hung midway between exploitation and apathy. A new group of men were coming to take the padres' place—the naturalist explorers. They were the precursors of big business." When Darwin had "fallen upon an ossuary of lost world mammals," he is described as being "in a state which might have been analysed as complete delirium."

Even "dipping into "Lyell's *Principles of Geology* appears to have produced remarkable reactions in Charles Darwin, for "his mind was stupefied" and "to merely think of the Andean system and the infinities of geological time needed to create it, gave him a wonderful feeling. Why, millions of ages were but the infinitesimal part of eternity. If this were true about rocks and animals, what about man? Time only could have explained the presence of the Fuegians. He sat bolt upright in the worn hammock. Time"!

There is no sign that the work of the great Catholic missionaries in the days when every expedition in the interior of the continent was a perilous trail blazing has been studied—let alone sympathetically studied.

One wishes that Mr. Victor von Hagen could have captured something of the dignity and sobriety of the literary style of the subjects of his potted biographies. But none the less we should be grateful for *South America Called Them*, for the time spent in writing and reading the book will not have been spent in vain, should it be nothing more than a lively introduction to a relatively unknown world and make the curious reader anxious to become acquainted at first hand with the great classics of travel in South America.

"Mushroom Growing To-day." By F. C. Atkins, 187 pp. (Faber & Faber.) 12*s.* 6*d.*

Although primarily intended for specialist mushroom growers, amateurs and horticulturists in general will find much of interest in this book.

The greater part is devoted to a discussion of the theory and practice of mushroom growing on a commercial scale. Since no two lots of manure or casing soil are alike, there can be no hard and fast rules for composting, watering the beds and other processes. Inevitably, therefore, there is great diversity of opinion among growers about many of the practices of mushroom growing. Mr. Atkins draws on his own experience and that of growers and scientists at home and abroad to discuss all aspects of mushroom culture. He succeeds in presenting an excellent picture of present-day ideas and practice which will help all growers in the course of their work.

Several short chapters are devoted to mushroom growing on a small scale by amateurs and market gardeners. These chapters contain a number of useful hints on growing in cellars, outbuildings and out of doors. In conjunction with the main part of the book they should be valuable to the amateur who wishes to experiment.

There are also chapters on pests and diseases of the mushroom and on the history and economics of mushroom growing.

The illustrations are good and include a number of drawings of insect pests. Lists of firms supplying equipment form a useful feature of the book.

P. H. WILLIAMS

"Flowering Trees and Shrubs in India." By D. V. Cowen. 137 pp. Illus. (Thacker & Co. Ltd., Bombay; Wheldon & Wesley, London.) 35*s*.

This is a charming book, destined to be a source of pleasure and enlightenment to plant lovers in the plains of India. The authoress says that she is not a botanist; but if, by botanist, is meant a student of plants, I disagree with her. She has become expert in the pictorial representation of plants, and this she could not have done without studying them. Without deep and loving study she could have made neither the coloured plates representing flowering sprays nor the magic pencil sketches of the habit of the plants. In these sketches she has exceeded the generality of those who describe and figure trees, who too often give us little or no information about their general appearance. The text accompanying the figures is full of interesting information and the Colour Key will enable those using the book to identify, without difficulty, the plants dealt with. It is a pity that more attention has not been paid to the binding. The plates are unmounted and will soon separate from the strings to which they are attached.

H. GILBERT-CARTER

"Anzucht und Kultur der Bromeliaceen mit besonderer Berücksichtigung der für den Handel wichtigsten Arten." By W. Richter. 84 pp. Illus. (Eugen Ulmer, Ludwigsburg.) DM 3.80.

"Dahlien im Garten und im Haus." By L. Jelitto and P. Pfitzer. 2nd ed. 91 pp. Illus. (Eugen Ulmer, Ludwigsburg.) DM. 4.20.

"Das Chrysanthemum, sein Formenreichtum and seine Kultur." By M. Marggraf and G. Hartmann. 4th ed. 72 pp. Illus. (Eugen Ulmer, Ludwigsburg.) DM. 2.80.

"Die Freiland-Schmuckstauden, 1: Anzucht und Kultur." By E. Eiselt and G. Krüssmann. 76 pp. Illus. (Eugen Ulmer, Ludwigsburg.) DM. 2.90.

The above four paper-covered little German handbooks belong to the excellent series *Grundlagen und Fortschritte im Garten und Weinbau* published by Messrs. E. Ulmer, formerly at Stuttgart, now at Ludwigsburg. Heft 76 by W. Richter is devoted to the Bromeliaceæ, a family now little cultivated in Britain but happily retaining its popularity on the Continent and becoming well known in America, for it includes many species handsome in both leaf and flower. The American Plant Life Society's publication *Plant Life*, Nos. 2 and 3 (1947), dealing exclusively with the Bromeliaceæ, has not come to the author's notice. Heft 65 by L. Jelitto and P. Pfitzer is a concise well-illustrated survey of Dahlia cultivation and includes a long list of varieties, among them many of German, Dutch and Belgian origin. Heft 17 by M. Marggraf and G. Hartmann deals equally concisely and efficiently with the Chrysanthemum. Heft 74 by E. Eiselt and G. Krüssmann is the first part of an encyclopædia on herbaceous plants, to be completed in ten parts. This describes methods of propagating herbaceous plants in general. Individual genera will be described alphabetically in the later parts. It is to be hoped that, despite present-day conditions in Germany, the authors will be able to take note of the conclusions on the nomenclature and classification of herbaceous plants resulting from research in Britain, Sweden and United States which have been made available during the last few years in N. Hylander's *Våra Prydnadsväxters Namn* (Stockholm, 1948), L. H. Bailey's *Manual of Cultivated Plants*, 2nd ed. (New York, 1949), *Curtis's Botanical Magazine* (London) and other publications. Small practical low-priced booklets like these are an admirable means of bringing such work to public notice and deserve a wide circulation among German-speaking gardeners.

W. T. STEARN

"A Monograph of Clavaria and Allied Genera." By E. J. H. Corner. "Annals of Botany Memoirs, No. 1." Oxford University Press (London, Geoffrey Cumberlege), 1950; pp. xv and 740, 16 coloured plates, 298 text-figures; price £5 5*s*.

In all of the old systems of classification of Basidiomycetous fungi, the groups were distinguished by gross morphological characters. One of the families was called

Clavariaceae, from its type genus *Clavaria*, and as may be inferred from the name the members of this family were all characterized by having an erect, cylindrical or club-shaped fruit-body, sometimes simple, sometimes branched in candelabra fashion, bearing basidia on its outer surface. Mr. Corner has studied these fungi by modern microscopic methods and has applied to them the views as to the importance of hyphal construction which he has already elaborated in papers dealing with certain Polyporaceous fungi. He has come to the conclusion that the group is polyphyletic, and therefore does not use a family name; in fact he adopts no systematic unit higher than the genus in the present work. The Clavarioid fungi of the world are placed in 27 genera, of which nine are new, with 540 species. Groups of genera which appear to be allied are put together as series.

Whether or not one agrees with Mr. Corner's premises, that hyphal construction is the primary index of affinity, and that all simple forms have arisen by degeneration from more complex branched forms, the book is indispensable to any student of Basidiomycetes. It contains a vast amount of information about these very attractive fungi, much of it from the author's own observations both in England and in Malaya. The text-figures are of the high standard that one associates with Mr. Corner's work, and serve to elucidate his theories as to structure. The coloured plates are also helpful for identification, though the figures of some species, particularly the yellow forms, have suffered in reproduction. Keys are provided for genera and species and at the end there is a glossary and a list of species and synonyms, but no general index. It is unfortunate that the price has been fixed so high that the book will be beyond the reach of most students.

E. M. WAKEFIELD

"Handbooks for the Identification of British Insects." Vol. 1, Part 6. Plecoptera. By D. E. Kimmins. 18 pp., 49 figs. 3*s*. 6*d*. net. Vol. 1, Part 9. Ephemeroptera. By D. E. Kimmins, 18 pp., 55 figs. 3*s*. 6*d*. net. Vol. 9, Part 2. Diptera, 2. Nematocera: families Tipulidae to Chironomidae. By R. L. Coe, P. Freeman and P. F. Mattingly. 216 pp., 199 figs. 20*s*. net. (Royal Entomological Society of London, 1950.)

The Series of Handbooks previously noted (R.H.S. JOURNAL, 1950, 75, 50), now include the above-mentioned parts written by specialists in the Orders concerned. The high standard set by the first three parts is maintained, and these textbooks will provide authoritative systematic data indispensable to all entomologists.

G. FOX WILSON

"Zur Kenntnis der Kontakt-Insektizide II." (Information on Contact Insecticides). By R. Riemschneider. 154 pp., 18 figs. (Dr. Werner Saenger, Berlin, and W. J. Johnson Inc., New York, 1950.) Price 9.90 DMark.

This is the second part of a comprehensive survey of Contact Insecticides, being a supplement of the Journal *Die Pharmazie*. The author has incorporated the researches of biochemists and entomologists throughout the world in a bibliography comprising 339 references which, together with his own investigations, provide a mass of informative matter of direct concern to all engaged in controlling crop pests. This part is so divided that the first section deals with DDT and DDD groups, the second with HCH. Information is given on their manufacture, composition and technology, chemical and physical attributes, their effect upon Arthropods and on cold- and warm-blooded animals, and analyses. Mention is made of those compounds which have been developed in Germany during recent years. The value of this work would be greatly enhanced if English translations of both parts were made available to a wider public.

G. FOX WILSON

"Guide to British Insects." By B. D. Moreton. 188 pp., 96 figs. (Macmillan & Co., London, 1950.) Price 8*s*. 6*d*. net.

This is a book of outstanding merit that deserves priority in the list of entomological textbooks used by zoological and entomological students during their period of training, and as a constant book of reference to all whose interests lie in the field of insect study. The keys that are given to the immature and mature stages of British insects are excellent though critical minds of systematists will find certain matters of controversy. It is sufficient to state, however, that the author has received guidance from Dr. F. van Emden in the matter of keys to some Orders.

There are seven chapters, including "Introduction," "List of Orders," "Structure and Life History of Insects," "Key and Description of Insect Orders," "Literature," and a brief glossary.

Some minor errors including one that names the reviewer as the author of the book whose title is given on p. 172 !

The clear and open printing, together with the size and general format of this book deserves high praise.

G. FOX WILSON

"Simple Propagation." By Noel J. Prockter. 144 pp. Illus. (W. H. & L. Collingridge, Ltd.) 6s.

This little book, so well illustrated, should be of great assistance to all keen amateur gardeners, and could even be very useful to the professional who wishes to refresh his memory on certain ways of propagation, which perhaps he has not done for many years.

It is so well written and illustrated, with each operation so clearly explained by the author, that the amateur following the instructions carefully can hardly fail to get excellent results for his labours.

The last chapter is devoted to an alphabetical list of trees, shrubs and other plants, with methods of propagation, so simply described, that one can find at a glance whether to sow seeds, propagate by cuttings, division or graft, and also the time to carry out such work, of almost everything the amateur would wish to grow in his garden.

A book really worth possessing, and the price is very reasonable.

P. DYKES

"The John Innes Glasshouses." Demy 8vo. Pp. 12. Illus. (John Innes Leaflet No. 10, Oliver & Boyd.) 1s.

The new John Innes glasshouses at Bayfordbury, near Hertford, have been built with a view to testing improvements in glasshouse design and management and incorporate many new and interesting features in their design. This leaflet has been prepared by Mr. W. J. Lawrence as a guide for visitors and for the assistance of other glasshouse growers who may be wishing to erect further houses. The lessons from the houses cannot be learnt for several years yet. It is, however, an experiment full of interest and we welcome this concise and clear leaflet about them.

"Newsham's The Horticultural Notebook." 4th edition. Revised by W. E. Shewell-Cooper. Cr. 8vo. Pp. 418. (The Technical Press.) 10s. 6d.

A handy book containing a great deal of useful and some rather unexpected information which the reviser rightly describes as a team effort. *Newsham's Horticultural Notebook* was first published in 1905 and has been known and used by two generations of horticulturists.

"Biology, an Introduction to Medical and other Studies." By P. D. F. Murray, M.A., D.Sc., Pp. viii + 600. With 381 text figures. (Macmillan and Co. Ltd.) 25s. net.

In the preface to this book the author, who is Professor of Zoology in the University of Sydney, says: "A danger in writing a text-book of biology is that of adding a book on botany to another on zoology, clapping them between the same covers, and calling the result biology." He rightly maintains that biology is a synthesis, rather than a mere addition, of these two subjects, and it is on this theme that the book has been written. The subject is covered in 53 chapters. Unicellular organisms are first dealt with, followed by more complex forms such as the fern and the frog, showing how these are adapted to live on land although they retain evidence of an aquatic ancestry in their life-histories. Flowering plants and more highly evolved animals such as the rabbit, which both in their structure and life-cycles are more definitely adapted for life on land, are also described. The wide scope of the book is shown by the fact that the physiology, nutrition and embryology of various plants and animals comprise only a selection of the other topics discussed. The text is clearly written, and another excellent feature of the book is the numerous line drawings, most of which are original and have been prepared from actual specimens.

It is almost inevitable, in a book of such wide scope, that a specialist should be able to find small points that could be improved. Thus to the reviewer, who is a plant anatomist, it appears desirable to reserve the term "wood fibres" for those that occur in the xylem. Then again, recent developmental studies have shown that the "pericycle" is not really so distinct from the phloem as is implied in this book, and the terms "dermatogen," "periblem" and "plerome" are now obsolete and should not be perpetuated in a new text-book. These are but small blemishes, however, in a book which is generally excellent, and which can be recommended to all who contemplate the serious study of biology.

C. R. METCALFE

"The Gardens of Hampton Court." By Mollie Sands. Pls. + 247 pp. (Evans Bros. Ltd.) 21s.

An immense amount of information is available about Hampton Court and many books have been written on it. Miss Sands has added another pleasant volume to the tea-table histories so popular at the present time, and no doubt it will find its public. But her title is misleading and will bring disappointment to horticulturists. The interest of the book lies in the social and personal element, and though the history of the Gardens is picked up from time to time, the connection is not close enough to justify the name. Miss Sands ranges over a wide field of political and social history, and she is a little too apt to find grist for her mill in any picturesque tale that strikes her imagination. Thus we hear again the only too well-known story of EVELYN's holly-hedges at Deptford, and are given a paragraph on the tobacco plant simply because it would *not* have been encouraged at Hampton Court by JAMES II. Those, however, who come to the subject for the first time, will find in the book a lively and suggestive introduction to many lines of interest.

The absence of an Index makes it impossible to look up any point of interest quickly, and the source of the plates is not indicated. A succession of plans showing the lay-out of the gardens at different periods would have been particularly valuable, but even if these were not provided, surely there should have been at least a ground-plan of the gardens as they are to-day. Some misprints occur, e.g. "Iconographia" for "Ichnographia" (p. 202) and "the Hon. Evelyn Cecil" throughout should, of course, be "the Hon. Mrs. Evelyn Cecil."

F. CARDEW

"The Principles and Practice of Cider-Making." By G. Warcollier, translated by Vernon L. S. Charley and Pamela M. Mumford. 367 pp. Illus. (Leonard Hill.) 35s.

This is a translation of the last (1928) edition of Professor G. Warcollier's standard work *La Cidrerie* somewhat condensed and brought up to date with additional matter, the illustrations being largely new and English. There is an interesting chapter on *eau-de-vie de cidre*, more familiar to travellers in France under the name of 'Calvados,' which ought to encourage British cider-makers to revive the distillation of Apple-Jack. Useful lists are given of all the principal varieties of cider-apples and perry-pears grown in England, France, Switzerland and the Rhineland, though not those of Spain, which rather surprisingly exports more cider than any other country. An account is included of experiments with the unblended juice of a few English dessert and dual-purpose Apples that were apparently chosen almost haphazard and might have been more profitably selected. The only one to yield cider of any quality was 'French Crab,' which seems added justification for retaining a name Dr. Hogg tried so hard to discourage. Altogether it is an invaluable book and one that fills a long-felt gap.

P. M. SHAND

"Tomato Diseases." By Robert McKay. (Colm O Lochlainn, Dublin.) Pp. 107. Illus. 2s.

This is an excellent little book on the troubles which affect Tomato crops in Ireland. After reading it one feels that Irish growers are fortunate in having a Professor of Plant Pathology who also possesses an expert knowledge of the practical side of Tomato growing. Professor McKay has certainly given them some most valuable information about Tomato diseases, ranging from recognition of the symptoms to methods required for prevention or control.

In the book there are separate sections on fungus, bacterial and virus diseases, on miscellaneous troubles such as abnormal fruits and rogue plants, on insect damage and on infestation by eelworms. The final section is devoted to general observations including advice on what can be called good cultivation and laying special emphasis on attention to hygiene and selection of healthy planting material. After each disease there are references to relevant literature concerning it, and distributed throughout the text are no fewer than 88 illustrations.

The book holds its interest throughout and will appeal to the busy grower because it is brief yet provides valuable information in a very readable form. The author has rendered good service to the Irish Tomato growing industry with this publication. The publisher is also to be congratulated—the print is pleasant to read and the illustrations are excellently done. We may be forgiven for thinking the price is rather high for a book of this size.

D. E. GREEN

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FRUIT AND VEGETABLE COMMITTEE—Mr. F. A. Secrett, C.B.E., F.L.S., V.M.H., in the Chair, and twelve other members present.

Award Recommended:

To the Hon. Mrs. George Lane, Ashton Wold, Oundle, Peterborough, for a group of Soft Fruit (principally Gooseberries).

Other Exhibit

Apple 'Hambledon Deux Ans,' from The Principal, Dorset Farm Institute, Kingston Maurward, Dorchester.

FLORAL COMMITTEE A—Mr. G. W. Leak, V.M.H., in the Chair, and nineteen other members present.

Awards Recommended:

Gold Medal

To Messrs. Carters Tested Seeds, Ltd., Raynes Park, for an exhibit of Gladioli.
To Messrs. Konynenburg & Mark, Noordwyk, Holland, for an exhibit of Gladioli.

Silver-gilt Flora Medal

To Messrs. Blackmore & Langdon, Bath, for an exhibit of Phloxes and other herbaceous plants.
To Messrs. Kelway & Son, Ltd., Langport, for an exhibit of Gladioli.
To Messrs. H. Woolman, Ltd., Birmingham, for an exhibit of Begonias.

Silver-gilt Banksian Medal

To Messrs. Mortlock Bros., Langley, for an exhibit of Fuchsias.
To Messrs. W. J. Unwin, Ltd., Histon, for an exhibit of Gladioli.
To Messrs. E. Webb & Sons (Stourbridge), Ltd., Stourbridge, for an exhibit of Phloxes and Gladioli.

Silver Flora Medal

To Messrs. Allwood Bros., Ltd., Haywards Heath, for an exhibit of Carnations.
To Messrs. T. Carlile, Ltd., Twyford, for an exhibit of Phloxes.
To Messrs. van Zanten Bros., Hillegom, Holland, for an exhibit of Gladioli.

Silver Banksian Medal

To Messrs. M. Prichard & Sons, Ltd., Christchurch, for an exhibit of herbaceous plants.
To Messrs. D. Stewart & Son, Ltd., Ferndown, for an exhibit of Gladioli.
To Messrs. Wakeley Bros. & Co., Ltd., North Mymms, for an exhibit of Gladioli.
To Messrs. John Waterer, Sons & Crisp, Ltd., Twyford, for an exhibit of Phloxes and other herbaceous plants.

Flora Medal

To Messrs. Allwood Bros., Ltd., Haywards Heath, for an exhibit of *Dianthus Allwoodii*, etc.
To Mr. H. A. Brown, Chingford, for an exhibit of Fuchsias.
To Messrs. G. & A. Clark, Ltd., Dover, for an exhibit of herbaceous plants.
To Messrs. Daniels Bros., Ltd., Norwich, for an exhibit of Phloxes.
To Messrs. Hale & May, Ltd., Cookham, for an exhibit of herbaceous plants and Roses.
To Mr. L. S. Harbutt, Wickhambrook, for an exhibit of herbaceous plants.
To Messrs. Laidlaw Gladiolus, Ltd., Newquay, for an exhibit of Gladioli.
To Mr. E. B. Le Grice, North Walsham, for an exhibit of Roses.
To Messrs. R. & E. Ratcliffe, Chilton, for an exhibit of Roses.
To Messrs. Ryder & Son (1920), Ltd., St. Albans, for an exhibit of Phloxes.
To B. H. B. Symons-Jeune, Esq., Old Windsor, for an exhibit of seedling Phloxes.
To Messrs. Wheatcroft Bros., Ltd., Ruddington, for an exhibit of Roses.

Banksian Medal

To Mr. A. Miles, Bickley, for an exhibit of herbaceous plants.
To Messrs. Sale & Son (Wokingham), Ltd., Wokingham, for an exhibit of herbaceous plants.
To Messrs. E. C. Simmonds & Son, St. Albans, for an exhibit of herbaceous plants.
To F. T. S. Stagg, Esq., Woodford Green, for an exhibit of Coleus.

Award of Merit

To *Kniphofia*, 'Honeycomb,' as a variety for exhibition (votes 15 for, 0 against), from Messrs. M. Prichard & Sons, Ltd., Christchurch.

Selected for trial at Wisley

Dianthus seedling, from F./Lt. W. W. R. Jones, Askett, Bucks.
Kniphofia 'Gladiator,' from Messrs. M. Prichard & Sons, Ltd., Christchurch.
Rudbeckia Sullivantii 'Goldsturn' (subject to verification of name), from Messrs. T. Carlile, Ltd., Twyford.
Viola 'Chantreyland,' from Messrs. R. H. Bath, Ltd., Wisbech.

Other Exhibits

Antirrhinums, from Messrs. Fidler & Sons, Reading.
Carnation 'Bennie Fancy,' from C. N. Nichols, Esq., Stretford.
Chrysanthemums, from Mr. A. Miles, Bickley.
Pelargonium 'Vivid,' from J. S. Milne, Esq., Newcastle.
Roses and Violas, from Mr. C. A. Jardine, Feltham.

FLORAL COMMITTEE B—Lord Aberconway, C.B.E., LL.D., V.M.H., in the Chair, and sixteen other members present.

Awards Recommended:

Flora Medal

To Mr. K. W. Harle, Lower Basildon, for an exhibit of succulents.
To Messrs. L. R. Russell, Ltd., Windlesham, for an exhibit of greenhouse shrubs.
To Mr. F. Street, Woking, for an exhibit of flowering shrubs.
To Winkfield Manor Nurseries, Ascot, for an exhibit of rock garden plants and shrubs.

Banksian Medal

To Kew Topiary Nurseries, Richmond, for an exhibit of clipped box and bay trees.
To Messrs. Robinson, Eltham, S.E. 9, for an exhibit of rock garden plants.

Award of Merit

To *Buddleia Davidi* 'Royal Red' as a hardy, flowering shrub (votes 12 for, 0 against), from Messrs. R. C. Notcutt, Ltd., Woodbridge.
To *Rhododendron prunifolium* as a hardy, flowering shrub (votes unanimous), from The Commissioners of Crown Lands, Windsor Great Park, Berks.

Other Exhibits

Bougainvillaea glabra Cypheri, exhibited by Capt. R. J. B. Bolitho, Gouray Lodge, Jersey, C.I.
Buddleia Davidi 'Purple Splendour,' exhibited by Mr. E. B. Le Grice, Roseland Nurseries, North Walsham, Norfolk.
Hypericum patulum 'Hidcote,' exhibited by Messrs. T. Hilling & Co., Chobham, Surrey.
Hoheria populnea, exhibited by Col. F. C. Stern, O.B.E., M.C., F.L.S., V.M.H., Highdown, Goring-by-Sea, Sussex.

ORCHID COMMITTEE—Lord Aberconway, C.B.E., LL.D., V.M.H., in the Chair, and eight other members present.

Awards Recommended:

Award of Merit

To *Cypripedium* 'Vanda M. Pearman' (*bellatulum* × *Delenatii*) (votes 6 for, 1 against), from K. D. Morgenstern, Esq., 18 Lyttelton Road, London, N.2.

JOINT EARLY FLOWERING CHRYSANTHEMUM COMMITTEE—Mr. E. F. Hawes, in the Chair, and ten other members present.

Awards Recommended:

First Class Certificate

To 'Orange Sweetheart,' for exhibition and market (votes 7 for, 0 against), and 'Salmon Sweetheart,' for exhibition and market (votes 7 for, 0 against), both shown by Colham Green Nurseries, Ltd., Chapel Lane, Hillingdon, Middlesex.

Award of Merit

To 'Deep Red Sweetheart,' for exhibition and market (votes 7 for, 0 against), and 'Golden Sweetheart,' for exhibition and market (votes 7 for, 0 against), both shown by Colham Green Nurseries, Ltd., Chapel Lane, Hillingdon, Middlesex.

Selected for trial at Wisley

'Deep Red Sweetheart' and 'Golden Sweetheart,' shown by Colham Green Nurseries, Ltd., Chapel Lane, Hillingdon, Middlesex.

'August Beauty,' shown by Messrs. Greenyer Bros., Ltd., Broadwater Green Nurseries, Worthing, Sussex.

Other Exhibits

'Peach Sweetheart' (**A.M.** 1949), 'Apricot Sweetheart' (**A.M.** 1949), 'Carol' (**F.C.C.** 1948), 'Cotswold Gem' (**A.M.** 1948) (to be seen again), 'Egerton Sweetheart' (**A.M.** 1945), 'Edensor' (**A.M.** 1947), 'Bronze Christine,' 'Bronze Sweetheart,' 'Pearl Sweetheart' and 'Sweetheart,' all shown by Colham Green Nurseries, Ltd., Chapel Lane, Hillingdon, Middlesex.

JOINT ROCK GARDEN PLANT COMMITTEE—Col. F. C. Stern, O.B.E. M.C., F.L.S., V.M.H., in the Chair, and twelve other members present.

Exhibit

Saussurea stella (Yu. 13939) which was referred to the Scientific Committee, from The Director, Chelsea Physic Garden, Swan Walk, Chelsea, London, S.W. 3.

August 15, 1950

JOINT EARLY FLOWERING CHRYSANTHEMUM COMMITTEE—Mr. G. W. Leak, V.M.H., in the Chair, and eleven other members present.

Awards Recommended:

First Class Certificate

To 'Cotswold Gem,' as a market variety (votes 9 for, 1 against), raised by Mr. W. Avery, and shown by Colham Green Nurseries Ltd., Hillingdon, Middlesex.

Award of Merit

To 'Rearlight,' as a variety for exhibition and market (votes 7 for, 1 against), and 'Foremost,' as a variety for exhibition and market (votes 9 for, 2 against), both shown by Messrs. J. & T. Johnson, The Nurseries, Tibshelf, Derbyshire.

To 'Yellow Sands,' as a variety for exhibition and market (votes 10 for, 0 against), shown by Mr. John R. Bell, Southdown Nurseries, Horam, E. Sussex.

To "Sport from 'Radar'" (subject to naming) as a variety for exhibition and market (votes 11 for, 0 against), shown by Mr. H. Johnson, 4 Colonial Road, Slough Bucks.

To "Seedling 'I'" (subject to naming) for exhibition and market (votes 11 for, 0 against) shown by Colham Green Nurseries Ltd., Hillingdon, Middlesex.

Selected for trial at Wisley

'Rearlight' and 'Foremost,' shown by Messrs. J. & T. Johnson, The Nurseries, Tibshelf, Derbyshire.

'No. 1 Pom,' shown by Messrs. H. Shoesmith Ltd., Mayford Nurseries, Westfield, Woking.

'Yellow Sands' shown by Mr. John R. Bell, Southdown Nurseries, Horam, Sussex.

"Sport from 'Radar'" shown by Mr. H. Johnson, 4 Colonial Road, Slough, Bucks.

"Seedling 'I'" shown by Colham Green Nurseries Ltd., Hillingdon, Middlesex.

Other Exhibits

'Serenade,' (**A.M.** 1948), shown by Messrs. H. Shoesmith Ltd., Mayford Nurseries, Westfield, Woking.

'Salmon Vernon,' shown by Mr. G. R. Bacon, Heathfield Nurseries, Ecclesfield, Bradford.

"Seedling 'E'" and "Seedling 'B'" shown by Colham Green Nurseries Ltd., Hillingdon, Middlesex.

JOINT DAHLIA COMMITTEE—Mr. G. Monro, C.B.E., V.M.H., in the Chair, and eleven other members present.

Awards Recommended:

Award of Merit

To Dahlia 'Croydon Masterpiece,' as a variety for exhibition (votes 10 for, 0 against), from J. Riding, Esq., Hockley, Essex.

Selected for trial at Wisley

Dahlias 'Mary Wills,' 'Yellow Plume' from A. T. Barnes, Esq., Bedford.

Dahlias 'Loesje,' 'Jescot Lingold,' 'Jescot 620' (to be named).

Dahlia 'Croydon Masterpiece' from J. Riding, Esq., Hockley, Essex.

Dahlia 'Almeh,' 'Jaune Belge' from Messrs. J. F. Spencer & Son, Ltd., Hockley, Essex.

Dahlias 'Appledore,' 'Barbara Bacon,' 'Beckley,' 'Canon Griffiths,' 'Steyning' and another variety subject to naming.

Other Exhibits

Dahlias were also submitted by G. B. Williams Esq., Crowthorne.

AUGUST 29, 1950

SCIENTIFIC COMMITTEE—Mr. E. A. Bowles, M.A., F.L.S., F.R.E.S., V.M.H., in the Chair, and seven other members present.

Gladiolus Thrips.—Mr. Fox Wilson stated that the presence of the Gladiolus Thrips (*Taeniothrips simplex* Morison), had been confirmed in England during August 1950 on both commercial and garden stocks of Gladiolus in many widely separated areas. This American species of Thrips overwinters on the corms and, from data received, would appear to have been present in this country in 1949 and perhaps earlier. High populations were built up during August and infested blooms were rendered useless.

Stolons of Yellow Loosestrife.—Mr. N. K. Gould illustrated the colonizing ability of the Yellow Loosestrife (*Lysimachia vulgaris*) by exhibiting a floating stolon 12 feet long taken from a ditch at Wisley. It had grown to this length in about four months.

Musk Rose.—Mr. E. A. Bowles exhibited a flowering spray of a climbing Rose with delightfully scented, creamy white, semi-double flowers, illustrated in Redouté and Thory, *Les Roses* 1, 99 (1817) as *Rosa moschata flore semi-pleno*, which he had acquired from Canon Ellacombe at Bitton, many years ago, and which was thought to be the musk Rose of Shakespeare. It is a fine garden plant which has almost disappeared from cultivation but deserves to be propagated and widely grown.

Green-flowered Dahlia.—A green-flowered Dahlia from Wisley was examined with much interest. It did not appear to be absolutely identical with the form previously known as *Dahlia viridiflora* but was morphologically comparable, the coloured florets being mostly suppressed and the scales of the receptacle much enlarged and leafy. The heads were about 3·5 to 4·5 cm. in diameter; some were totally green; others had a few crimson florets to 1·5 cm. long, 1·8 cm. broad.

Chrysalis of Eggar Moth.—Mr. W. G. MacKenzie showed a large cocoon found on a clump of white Heather (*Calluna vulgaris* forma). It was identified as that of the Northern Eggar Moth (*Lasiocampa quercus* var. *callunae* Palmer).

Provenance of Chrysanthemum praeteritum.—In 1930 A. R. Horwood described a new species, *Chrysanthemum praeteritum*, from a plant of unknown origin cultivated at Kew since 1912.

The affinities of this species, which is of low sub-shrubby growth and has attractive silvery tomentose foliage and white flowers, indicated that it had probably been introduced from Asia Minor. This has now been confirmed by the collecting of Mr. Peter Davis. Mr. W. T. Stearn exhibited a dried specimen from the type-plant of *Ch. praeteritum* at Kew and another specimen from a plant recently introduced by Davis from southern Asia Minor. Though not completely identical, the two belong to the same species. According to Briquet's classification, this should be placed in *Tanacetum* though very distinct from the common Tansy (*Tanacetum vulgare*).

Hybrid Senecio.—Mr. W. T. Stearn exhibited living specimens of *Senecio squalidus* (Oxford Ragwort), *S. viscosus* and the hybrid between them, *S.* × *londinensis* Lousley in *Rept. Bot. Exch. Club Brit.* 12, 311 (1946), gathered that day in Vincent Square. Vigorous plants of the hybrid were as much as 2 feet high and loosely branched, with ray florets intermediate in size between those of the parent species.

Large-leaved Oak.—The Committee examined some extremely large leaves of the common Oak (*Quercus Robur*) communicated by Mr. J. B. Sherlock, Renvyle, Billingshurst, Sussex. They came from a single branch, one of the lowest on the tree, which had been lopped last year. As they were outside the usual range of variation of *Q. Robur*, there seemed a possibility that a doubling of chromosomes had taken place and the Committee recommended that the branch should be kept under observation.

Pelargonium Hybrids.—Mr. A. Langley Smith placed before the Committee some young plants of Pelargonium hybrids derived from crosses made in 1910 between *Pelargonium denticulatum* and *P. filicifolium* and others derived from later crosses of *P. denticulatum*, *P. quercifolium* and *P. radula*. Variegated seedlings had appeared and this variegation had been inherited by some of their progeny.

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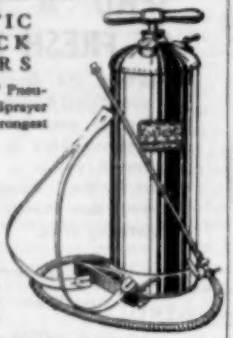

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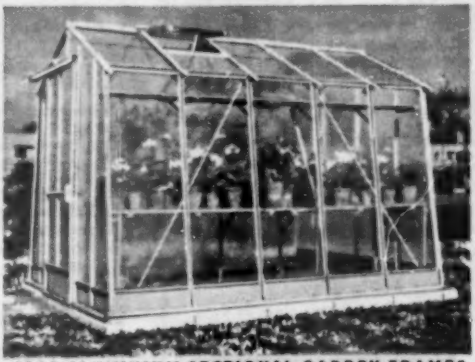

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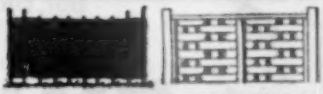

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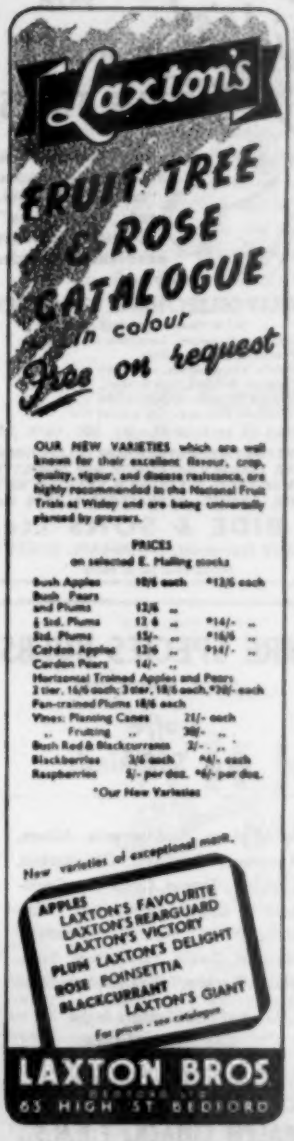
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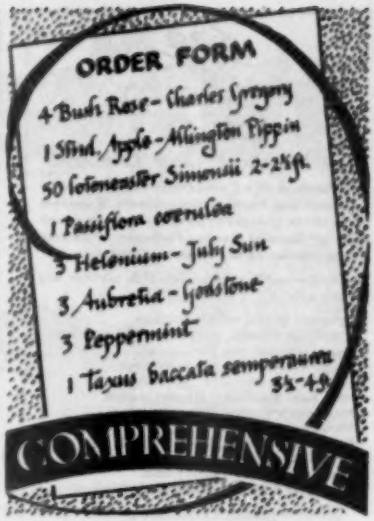

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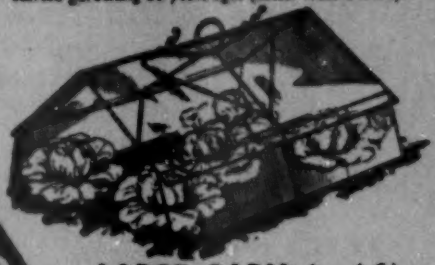

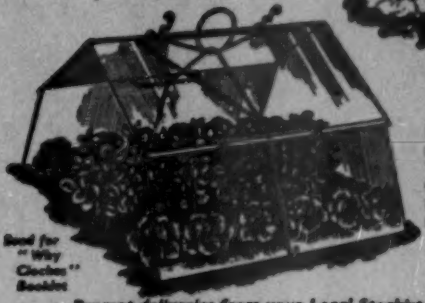

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